THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXI. No. 2076.] LONDON, FEBRUARY 24, 1903. [55TH YEAR. PRICE 6d.

PARKER & LESTER,

— ESTABLISHED 1830 —

MANUFACTURERS AND CONTRACTORS, **ORMSIDE STREET, LONDON, S.E.**

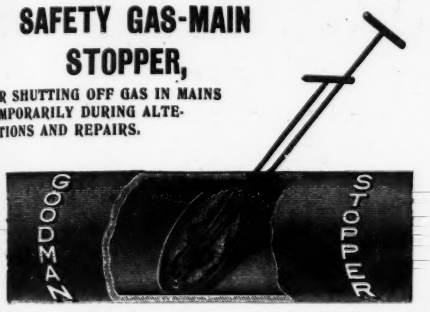
THE ONLY MAKERS OF

PATENT ANTIMONY PAINT & PARKER'S IMPERIAL BLACK VARNISH.

OXIDE PAINTS, OILS, AND GENERAL STORES, FOR GAS AND WATER WORKS.

SAFETY GAS-MAIN STOPPER,

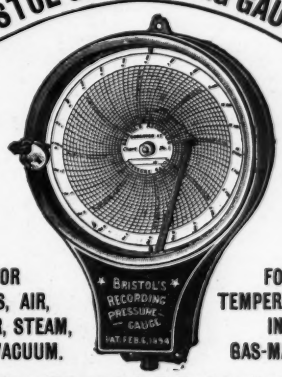
FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.



GAS-LEAK INDICATOR.

PRICES AND PARTICULARS ON APPLICATION.

BRISTOL'S RECORDING GAUGES



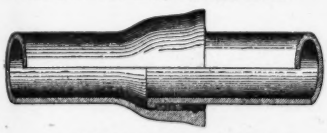
FOR GAS, AIR, WATER, STEAM, OR VACUUM.

FOR TEMPERATURE IN GAS-MAINS.

Many Thousands in Daily Operation.

J. W. & C. J. PHILLIPS,
23, COLLEGE HILL,
LONDON, E.C.

SOCKETS, WEIGHTS, & THICKNESSES



TO ENGINEER'S SPECIFICATION.

VERTICALLY CAST IRON PIPES.

Diameters 1½ in. to 78 in.

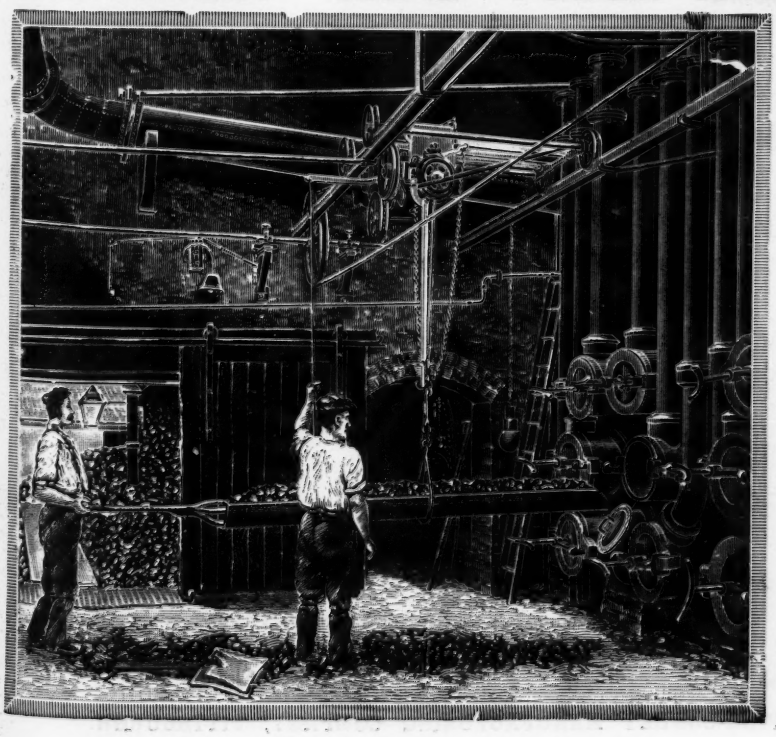
The Best Pipes on the Market and the Cheapest.

A. G. CLOAKE, 54, Holborn Viaduct, London, E.C.

Telegrams: "AMOUR, LONDON." Telephone Nos.: 1890 HOLBORN; CENTRAL 194.

BIGGS, WALL, & CO.

THE PATENT "RAPID" POWER CHARGING APPARATUS



FOR GAS-WORKS OF ALL SIZES.

ADDRESS:—

13, CROSS STREET,
FINSBURY PAVEMENT,
LONDON, E.C.

TELEGRAMS:—

"RAGOUT, LONDON."

These Machines can be seen in operation at:—

TRURO GAS-WORKS,

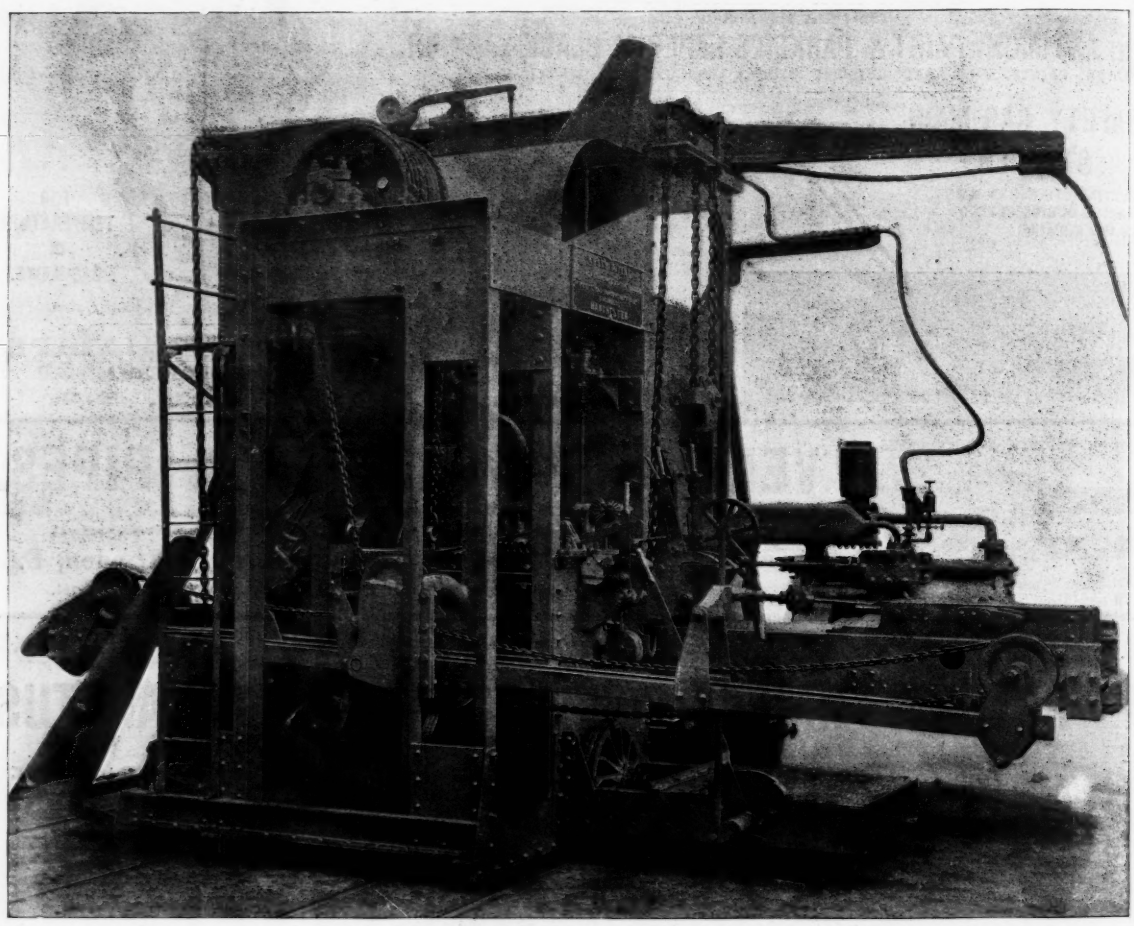
SHETTLESTON OIL & CHEMICAL COMPANY, GLASGOW.

Installation in course of Erection at the

EPSOM GAS-WORKS.

WEST'S STOKING MACHINERY

COMPRESSED AIR DRIVEN
CHARGING AND DRAWING MACHINES;
COMBINED CHARGING AND DRAWING MACHINES; also
MANUAL CHARGING AND DRAWING MACHINES.



West's compressed Air Driven Charging and Drawing Machine, requiring only One Machine driver and one attendant to charge and draw the Retorts, attend to the Mouthpieces, and fill the Furnaces.

All classes of Coal can be efficiently dealt with by the West's Charging Machines, and the Retorts are charged evenly throughout with the full weight of Coal.

Retort Houses fitted with West's Regenerator Furnaces, Stoking Machinery, and Coke Conveyors reduce the cost of Carbonizing Coal to a minimum.

WEST'S GAS IMPROVEMENT CO., LTD.

Albion Iron-Works, MILES PLATTING, MANCHESTER,

AND 104, QUEEN VICTORIA STREET, LONDON, E.C.

Manufacturers for America: RITER-CONLEY MANUFACTURING COMPANY, PITTSBURGH.

THE BARROWFIELD IRON-WORKS, LIMITED,

Late LAIDLAW, SONS, & CAINE, Limited,

GAS ENGINEERS & CONTRACTORS,

Telegrams: "GASOMETER GLASGOW."

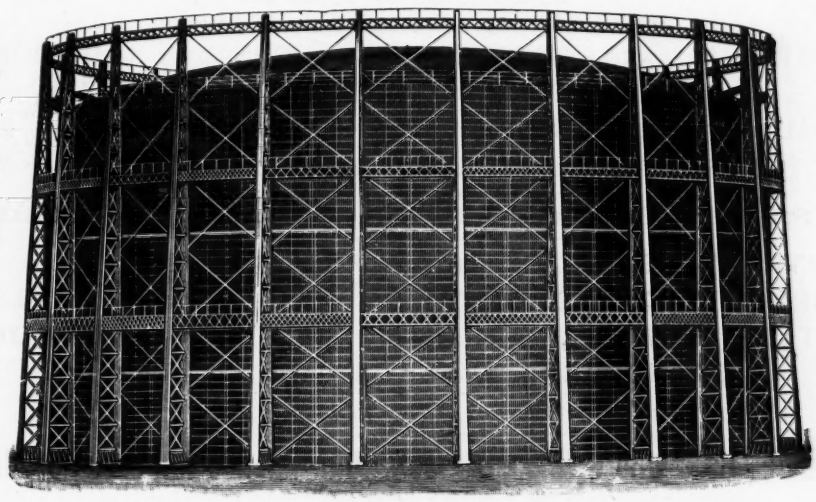
GLASGOW.

OIL PLANT AND CHEMICAL APPARATUS.

BRIDGES, GIRDERS WHARVES, PIERS.

ROOFING OF EVERY STYLE.

PIPES, VALVES AND CONNECTIONS.



GAS APPARATUS OF EVERY DESCRIPTION.

RETORTS, CONDENSERS, SCRUBBERS, PURIFIERS

GASHOLDERS AND TANKS.

ENGINES, EXHAUSTERS, STEAM BOILERS AND FITTINGS.

THREE-LIFT GASHOLDER. Capacity, SIX MILLION cubic feet.
240 feet Diameter by 45 feet Deep each Lift. Erected at Glasgow, 1893.

London Office: 6, LITTLE BUSH LANE, CANNON STREET.

GEORGE ORME & CO. (Branch of Meters Ltd.)

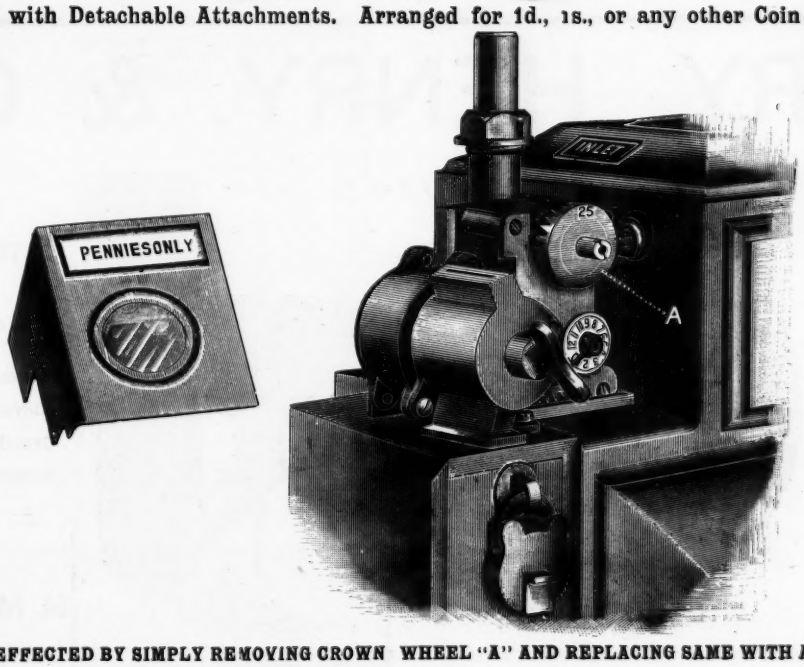
Atlas Meter Works, PARK STREET, OLDHAM.

Telegraphic Address: "ORME, OLDHAM." Telephone No. 93 OLDHAM.

"NEW CENTURY" PATTERN

Patent Coin *Prepayment Gas-Meters*

Fitted with Detachable Attachments. Arranged for 1d., 1s., or any other Coin desired.



CHANGE OF PRICE EFFECTED BY SIMPLY REMOVING CROWN WHEEL "A" AND REPLACING SAME WITH ANOTHER WHEEL.

NEWTON, CHAMBERS, & CO.,

LIMITED,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

Established 1790

LONDON OFFICE: 19, Great George Street, WESTMINSTER.

Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

GAS ENGINEERS, IRONFOUNDERS, & CONTRACTORS.

MANUFACTURERS OF EVERY DESCRIPTION OF

PLANT, APPARATUS, AND MACHINERY FOR GAS AND CHEMICAL WORKS, RETORTS AND FITTINGS, MOUTHPIECES WITH SELF-SEALING LIDS. IMPROVED COAL AND COKE HANDLING PLANT, CONVEYORS AND ELEVATORS, CONDENSERS, SCRUBBERS, AND WASHERS.

PURIFIERS with Planed Joints a Speciality.

PATENT CENTRE-VALVES, RACK AND SCREW VALVES, WOOD GRIDS, AND SCRUBBER-BOARDS, CAST-IRON MAINS, AND SPECIALS. STRUCTURAL WORK, COLUMNS, GIRDERS, AND ROOFING. GASHOLDERS, CAST-IRON OR STEEL TANKS.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (SPECIAL QUALITY) for Engine Cylinders. GAS COAL famous for its unrivalled excellence.

JOHN BROWN & CO., LTD., SHEFFIELD.

Proprietors of

ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·80.

VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS, SHEFFIELD."

BARRY, HENRY, & CO.,

— LIMITED. —

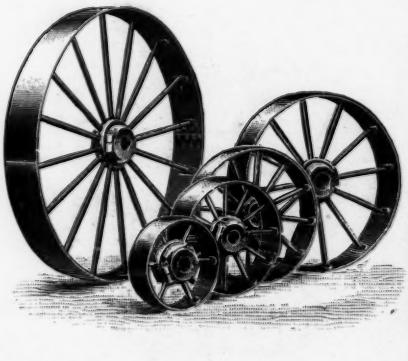
Specialities:

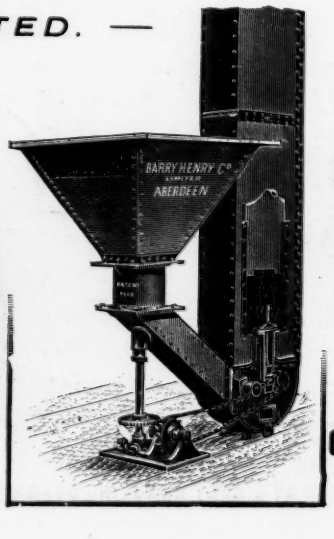
TRANSMISSION OF POWER.

Rope & Belt Pulleys,
Spur & Bevel Wheels,
Shafting & Couplings,
Pedestals, & Fixings.

WORKS:

ABERDEEN, SCOTLAND.





Specialities:

TRANSMISSION OF MATERIALS.

Conveyors,
Elevators,
Grinding Machinery,
Motors.

AND

64, MARK LANE, LONDON, E.C.

BRAY BURNERS.

"SPECIALS."

Sizes, 00 to 8.

Union-Jet.

Sizes, 1 to 9.

Slit-Union.

"SPECIALS"
For Globe Holders.

Sizes, 00 to 8.

Union-Jet.

Sizes, 1 to 9.

Slit-Union.

"ADJUSTABLE SPECIALS."

Sizes, Tops 1 to 8. Bottoms 00 to 6.

Union-Jet.

Sizes, Tops 1 to 9. Bottoms 00 to 6.

Slit-Union.

"MARKETS."

Sizes, 8 and 9.

Union-Jet.

Sizes, 10 and 1.

Batswing.

"REGULATORS."

Sizes, 00 to 7.

Union-Jet.

Sizes, 0 to 8.

Batswing.

"GAS ECONOMISERS."

Sizes, 1 to 8.

Slit-Union.

Sizes, 5 and 7.

Slit-Union.

"GEYSER" BURNERS.

These Burners are specially Strong so as to take the grip of the pliers without injuring the tips. For use in "Geysers" and the like.

Sizes, Union Jets, 00 to 7.

SEND FOR OUR 1902 BLUE BOOK.

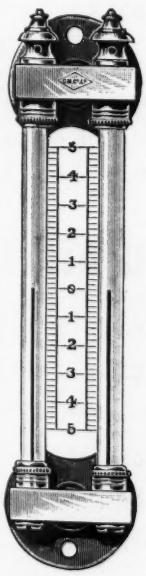
GEO. BRAY & CO., Gas-Lighting Engineers, **BAGBY WORKS** (OFF BLACKMAN LANE), **LEEDS.**

THE GAS-METER CO., LTD.,

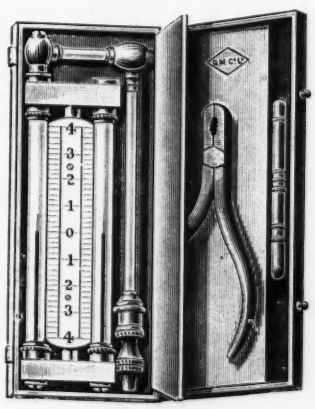
Manufacturers of

Wet & Dry Gas-Meters, Automatic Meters, Station Meters, Governors, Main Taps, Lamp Taps,

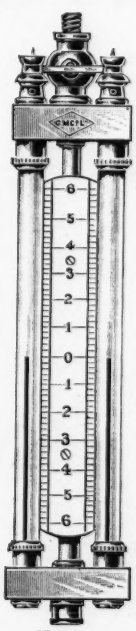
GAUGES, &c.



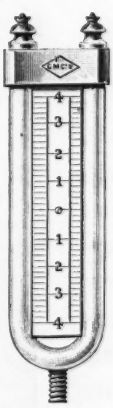
No. 1.



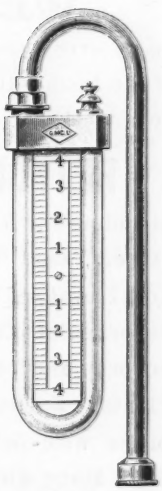
Inspector's Pocket Gauge.



No. 3.



No. 4.



No. 5.

For Prices and Particulars apply:

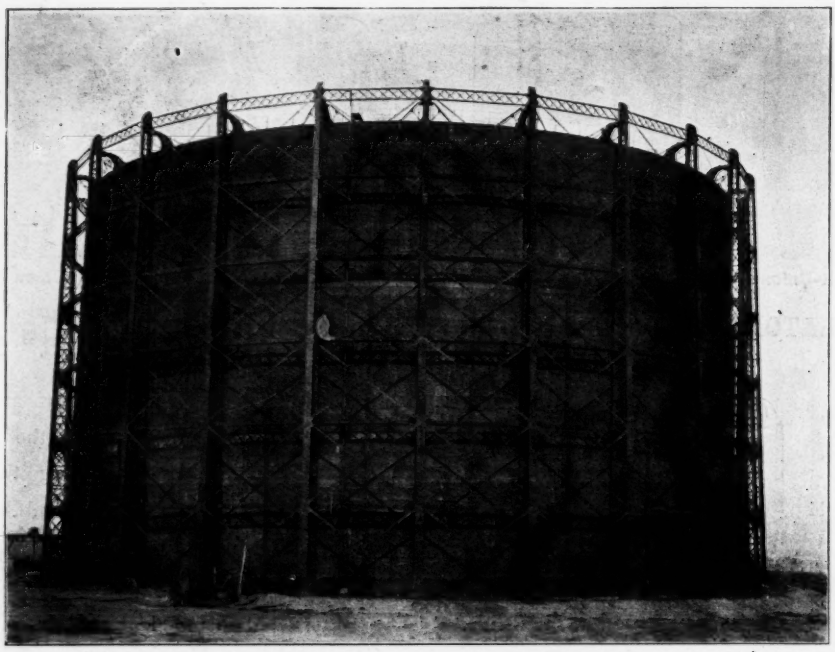
Telegraphic Addresses:
"METER, LONDON," "METER, OLDHAM."

Works: 238, Kingsland Road, LONDON; Union Street, OLDHAM; Hanover Street, DUBLIN.

THE WHESSOE FOUNDRY CO., LTD.

Works: DARLINGTON.

MAKERS OF EVERY DESCRIPTION OF GAS PLANT.



GASHOLDERS AND DRY-SEAL PURIFIERS A SPECIALITY.

NEWCASTLE AND GATESHEAD GAS CO
DIA. 236 FT. HEIGHT 133 FT.

THREE-LIFT GASHOLDER.
CAPACITY 6 MILLION CUB. FT.

London Office: 106, CANNON STREET, E.C.

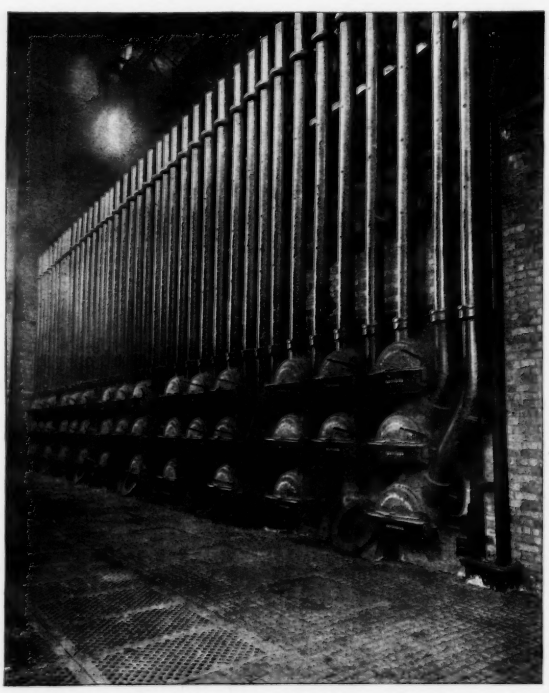
INCLINED RETORTS.

WE

make every single part of the Installation in our own Works at

RETFORD,

Including the Roofs, Coal Tippers, Coal Breakers, Coal Elevators, Coal Conveyors, Hot Coke Conveyors and Screening Plants, Retort Mouthpieces with Self-Sealing Lids, Stage Floors, Foul and Hydraulic Mains, Ascension, Arch, and Dip Pipes, &c., &c.



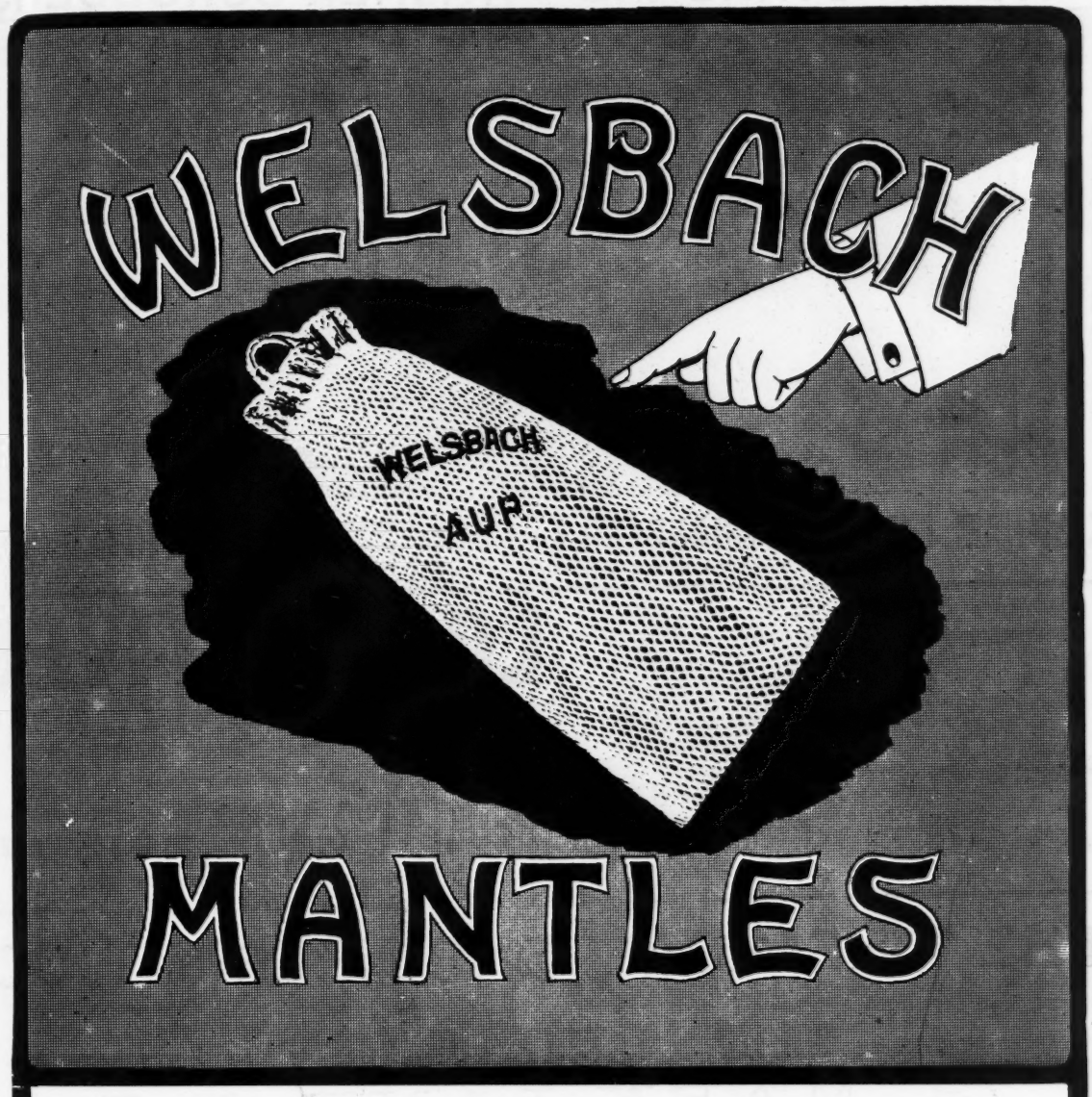
WE

only buy the Bricks and Raw Material. So under these conditions we have gained a

REPUTATION

for nothing but the Highest Class of Work, as can be seen in our Illustrations at Smethwick, Leek, Liverpool, Malvern, Shipley, &c., &c.

W. J. JENKINS & CO., Ltd., RETFORD.



There are no Mantles so good as Welsbach.

It is not only the facilities for manufacture, but the extreme care exercised in the making, that give the Welsbach Mantles their great superiority. Welsbach are in marked contrast to the hurriedly made inferior mantles retailed at lower prices, and which are unsatisfactory in use.

Perfect illumination is only obtained by the use of Welsbach Incandescent Mantles and Fittings.

All Genuine Mantles bear the Trade Mark "A U R."

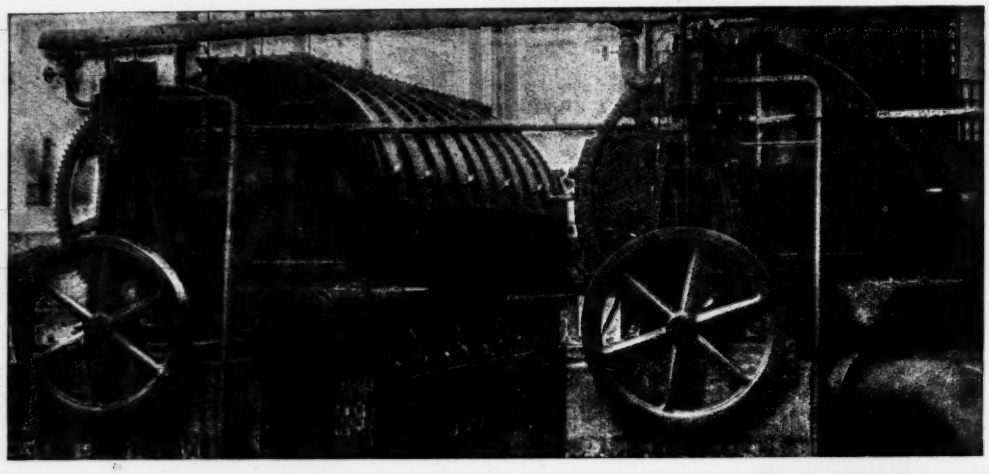
All Stores and Ironmongers sell them. Refuse inferior substitutes.

The Welsbach Incandescent Gas Light Co., Ltd., Palmer Street, Westminster.

PATENT "STANDARD" WASHER-SCRUBBERS.

Extract ALL the Ammonia and a large proportion of the CO_2 and H_2S.

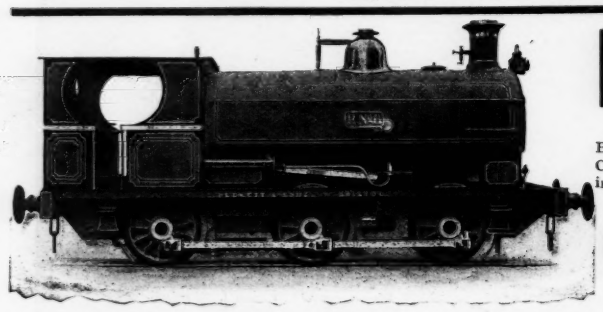
Maximum Washing Surface.
Prevention of Slip of Gas Unwashed.
Easy Access to Interior.



PATENT "STANDARD" CONDENSERS.
See last and next week's Advertisement.

KIRKHAM, HULETT, & CHANDLER, LD., PALACE CHAMBERS, BRIDGE STREET, **WESTMINSTER, S.W.**

Inspection invited of Machines in course of Construction.



LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for immediate Delivery.

Photographs, Specifications, and Prices on Application.

PECKETT & SONS, Atlas Locomotive Works, **BRISTOL.**

Telegraphic Address: "PECKETT, BRISTOL."

THE CHEMICAL ENGINEERING CO.

Telephone: No. 2669 AVENUE.
Telegrams: "EVAPORATOR, LONDON."

AND

WILTON'S PATENT FURNACE CO.,

CROWN WORKS, ABBEY LANE, STRATFORD, E.

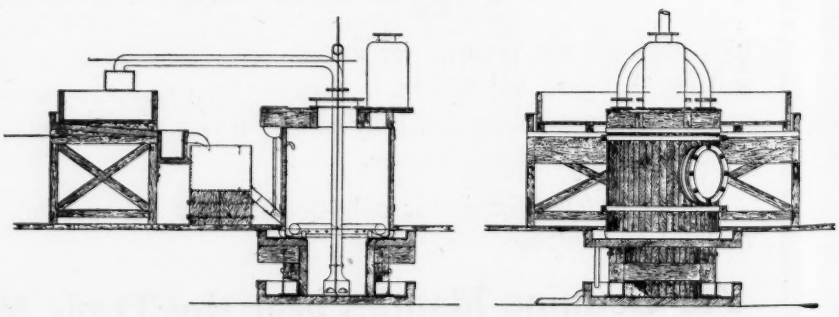
79, MARK LANE, E.C.

Contractors for the Supply and Erection of Sulphate of Ammonia Plant, Tar Distillation Plant, and Sulphuric Acid Plant.

IN USE AT:—

GASLIGHT & COKE CO.'S WORKS, BECKTON.
SOUTH METROPOLITAN GAS CO.
MANCHESTER CORPORATION GAS-WORKS.
BURT, BOULTON, & HAYWOOD.
MARGATE GAS-WORKS.
LONGPORT "
DOUGLAS "
WORTHING "
&C.

WILTONS PATENT SATURATOR & DISCHARGER.



LONGITUDINAL SECTION — FRONT ELEVATION

The make of Sulphate of Ammonia from the first round Saturator constructed has exceeded 40,000 Tons, and the repairs have been practically *nil*. Can be seen working by appointment.

CONVEYORS and ELEVATOR SPECIALLY DESIGNED FOR THE ABOVE PRODUCTS.

Wilton's Patent Neutralizing Apparatus for the Waste Gases from Sulphate of Ammonia Plant.

CONTENTS.

EDITORIAL NOTES.

GAS, LIGHTING, &c.—

The Meeting of the Commercial Gas Company—Retirement of Mr. H. E. Jones . 459
The Gas Man as Director—Cost of Carburetted Water Gas and Poor Coal Gas . 459
The Chagrin of Sir William Makins . . 460
Good Hopes of Cheaper Coal 460
The Lesson of Marylebone 461
A Municipal Scandal 461
Sir J. Gorst's New Prescription for Municipalism 462
Parliamentary Agents and Commissions to Town Clerks, &c.—A Word to American Gas Engineers—Seventy Years' Coal Prices—A Creditable Performance at Ipswich—Figures Worth Remembering—A Fair Sample—Ventilation of Electrical Conduits and Boxes—More of Thorium—An Irish Strike—Valuable Corroboration—A Plucky Child Prevents an Explosion 462

WATER AFFAIRS—

"Bearing" the London Water Supply. . 464
Moorland Water and Lead-Poisoning . . 465
Refusal to Sanction a Water-Works Purchase Scheme. 466

ESSAYS AND REVIEWS.

The Prospect of Cheaper Coal 466
The Reproductive Undertakings of English Municipal Corporations 467
The Granton Works of the Edinburgh and Leith Corporations. 468
Cost of Street Lighting by Electricity and Gas—A Remarkable Testimony for Incandescent Gas Lighting 471
Electric Lighting Memoranda 474
The System of Municipal Government—Some Curious Revelations 474
Gas and Water Stock Market 475

PARLIAMENTARY INTELLIGENCE.

Private Bills (Session 1903) 486

COMMUNICATED ARTICLES.

Mr. Glasgow on the War Path. By C. Dellwik 476
Fans in Gas-Works. By R. Gordon Mackay, Assoc.M.Inst.C.E. 477

TECHNICAL RECORD.

A Wooden Gasholder Tank 479
Manchester and District Junior Gas Association—Annual Dinner 479
German Progress in Cyanogen Recovery . . 479

REGISTER OF PATENTS.

Gas-Engines—Musgrave, B.. 482
Gas Lighting Device—Meier, G. 482
Bunsen Burners—Smith, J. A., and Dick, M. & D. C. 482
Caulking Pipes and Indicating the Position of Leaks—Gordon, J. C. 482
Hydraulic Sealed Centre-Valve for Working Gas-Purifiers—Blakeborough, W. . . . 483
Rotary Washer-Scrubbers—Chandler, J. & S. 483
Patent Notices. 484

CORRESPONDENCE.

Parliamentary Agents and Commissions . . 484
Mr. Glasgow on the War Path 484
The "JOURNAL" Prices as a Basis for Tar Contracts 485
Suggested New Gas-Stove—The Air of Rooms 485

LEGAL INTELLIGENCE.

High Court of Justice—
Chancery Division—Lamplough *v.* West Kent Water-Works Company, Limited, and Another 486
King's Bench Division—*In re* an Arbitration between Gough and the Aspatria, Silloth, and District Water Board. . . 487
Question as to Taking a Poll 487
Continental Incandescent Gas Company . . 488
Disputed Liability for Water-Rate 488
Damages for Injury by Gas Poisoning. . . 488
The Gas-Compressors at the Glasgow Exhibition 488

MISCELLANEOUS NEWS.

Commercial Gas Company 489
Liverpool United Gaslight Company . . . 491
Tottenham and Edmonton Gas Company . 492
Brentford Gas Company 493
Newcastle and Gateshead Gas Company . . 494
Croydon Commercial Gas Company—Half-Yearly Report and Accounts 495
Provincial Gas and Water Companies . . . 495
Stock and Share List 496
Proposed Loan from the Bradford Gas Reserve 497
Sales of Shares and Stocks 498
Electric Lighting Notes 498
Cardiff Corporation Water Supply 500
Wakefield Corporation Water Supply—Engineer's Report 500
Notes from Scotland 501
Current Sales of Gas Products 502
Coal Trade Reports 503

PARAGRAPHS.

A Daylight Photometer—Utilization of Waste Products 466
Carbon Monoxide as a Product of Combustion of the Bunsen Burner 473
Personal. 475
The Limits of Combustibility—Electricity *v.* Gas for Motive Power 481
Intensified Lighting in the Southport Market "Atmospheric" Gas at Southport—Gas Suffocation Case at Belfast 484
Slot Meters and the Bronze Currency . . . 488
Carburetted Water Gas Proposed for Southport 499
Water Charges at Wallasey 501
Successful Assessment Appeal at Bradford—Water Supply for Denton (Northants)—The Walker and Wallsend Gas Bill—City of St. Petersburgh New Water-Works Company, Limited—Water Scheme for Rishworth—Quality of the Gosport Water Supply . . 504
Extension of the Ferndale (Glam.) Gas-Works—Suicide by Coal Gas—Reductions in Price—Worksop Water Purchase Question—Irthlingborough Water Supply. . . . o

Messrs. HUMPHREYS & GLASGOW

AND

THE UNITED GAS IMPROVEMENT CO., U.S.A.

CARBURETTED WATER-GAS PLANT

— DOUBLE SUPERHEATER SYSTEM. —

H. & G., LONDON **132,750,000** Cu. Ft. Daily

U. G. I. CO., U.S.A. **317,925,000** Cu. Ft. Daily

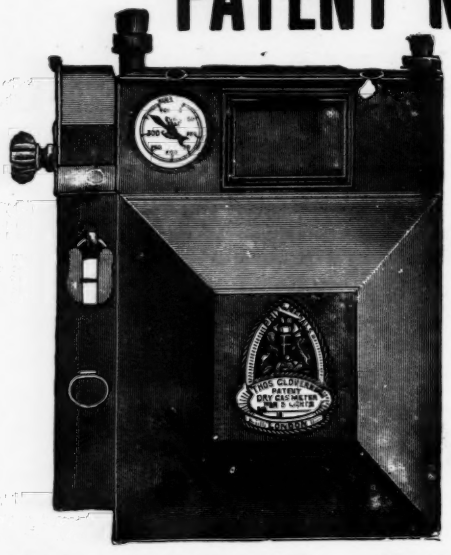
TOTAL 450,675,000 Cu. Ft. Daily

Messrs. HUMPHREYS & GLASGOW,
38, Victoria Street, London, S.W.
31, Nassau Street, New York.

THE UNITED GAS IMPROVEMENT COMPANY,
Philadelphia.

Telegrams: "EPISTOLARY, LONDON." "HUMGLAS, NEW YORK."

THOMAS GLOVER & CO.'S
PATENT NEW IMPROVED
PREPAYMENT METER



For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

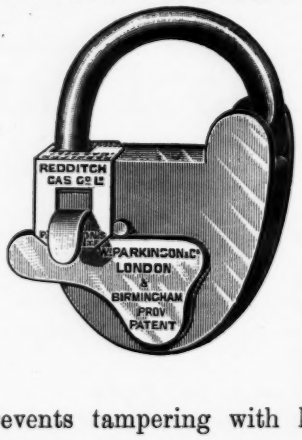
GUARANTEED FOR FIVE YEARS

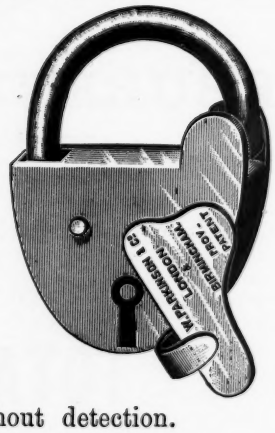
Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,
DRY GAS-METER MANUFACTURERS,
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN, LONDON, E.C.
Telegraphic Address: "GOTHIC, LONDON. Telephone No. 725 Holborn.

BRISTOL:	BIRMINGHAM:	MANCHESTER:	GLASGOW:
28, BATH STREET.	57 & 58, BROAD STREET,	37, BLACKFRIARS STREET.	26, WEST NILE STREET.
Telegraphic Address: "GOTHIC."	*Telegraphic Address:* "GOTHIC."	*Telegraphic Address:* "GOTHIC."	*Telegraphic Address:* "GASMAIN."
Telephone No. 1005.		Telephone No. 3898.	Telephone No.: 6107 Royal.

PARKINSON'S
PATENT PREPAYMENT METER SEAL LOCK





Prevents tampering with key-hole, or removal of Lock without detection.

No special Tool required by Inspector, the seal consisting of a strip of soft metal or other material with name embossed on; and this strip must be broken before lock can be undone.

Absolute security obtained at slight cost and by the simplest means.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*),
COTTAGE LANE, CITY ROAD, LONDON. | BELL BARN ROAD, BIRMINGHAM.

JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. LXXXI., No. 2076.—TUESDAY, FEBRUARY 24, 1903.

EDITORIAL NOTES.

The Meeting of the Commercial Gas Company—Retirement of Mr. H. E. Jones.

THE meeting of the Commercial Gas Company on Thursday was interesting for several reasons. It was the first to be held under the new dispensation, which has brought the Company alongside the other London Gas Companies as regards the timing of the half-yearly meetings. This will be convenient in various ways. The Chairman, Mr. W. G. Bradshaw, had a good deal to say to the proprietors that was interesting, and, as usual, he said it in an interesting way. It has been left to the present able occupier of the chair of the Company to make known the peculiar elements of interest belonging to the organization for the supply of gas to that part of the Metropolis which, in popular estimation, stands for all that is poverty-stricken and most heavily visited with the curse of Adam. On the present occasion, the Chairman's first point was the importance of the slot-meter connection in keeping the gas consumption of the district on the increase. Having made this point, and laid stress upon the virtue shown by the Board in husbanding the capital (which has been brought down to £426 per million), Mr. Bradshaw proceeded to deliver, with extraordinary dash and confidence, a brilliant lecture on the photometry of the Company's gas. This was the best performance of the kind on record. The style of the speaker is more like that of Counsel at the Parliamentary Bar than that of an engineering expert, as is only natural; but the matter of the speech is so sound, and so admirably put, that one would imagine the Referees and the London County Council must be hardly pressed to make a good case on the other side.

Only upon one technical detail did Mr. Bradshaw utter a slight misapprehension. Inasmuch as it is a point upon which some little misunderstanding exists elsewhere, it will be as well just to set the matter straight. Mr. Bradshaw remarked that, according to what has lately been established to the satisfaction of Parliament, the public requirement is cheap gas of low grade as regards its illuminating power. This is nearly correct, but not quite. The right faith is, that illuminating power is not the material consideration that it was—which is a different thing from granting a preference for low-grade gas. It is all a matter of what can be done at the price. There is no ideal standard. What is wanted is the happy medium between a gas carburetted at a cost which is so much waste because the consumer never gets any benefit from it, and a gas too poor to pay for distributing. This medium, so far as the Commercial Company are immediately concerned, is called by Act of Parliament 14-candle gas; and the Company are going to ask Parliament to see that the public get it, whatever the professors may do to prevent them. Meanwhile, as a guarantee of good faith, the Company are selling gas at a reduction of 2d. per 1000 cubic feet as from the beginning of the year, though they have not been allowed to drop the corresponding two candles in illuminating power.

The matter of most individual interest that transpired at the meeting was the arrangement under which Mr. H. E. Jones has retired from the position of Chief Engineer and General Manager of the Company with a life allowance of £1200 a year, to which will be added a seat on the Board. This is satisfactory for various reasons, altogether apart from the personality of Mr. Jones. It is a proof that gas engineering as a profession is still worth following by the right kind of man. On the other hand, the proprietors of a gas company with such a record as the Commercial have to show for the past 23 years, would be undeserving of their good luck in having had their affairs in such able hands, if they had acted otherwise by their chief officer. The undertaking has always been enclosed within a ring-fence, and nobody who knew it in 1880 could have foretold for it the condition it occupies to-day, as rehearsed in the Chairman's brief statement. As Mr. Jones himself remarked, he has witnessed in his time the perishing of the once flourishing sugar industry on Thames side, the decay of shipbuilding, the removal of the best of the dock trade, and the invasion of the East-end by the so-called pauper alien. But he conveyed the impression that the new population is not so hopeless as it is generally asserted to be. The Poles and Lithuanians may not at first know anything about gas, nor have the wherewithal to purchase it; but they quickly learn, and procure the coins to put into the slot meters. At any rate, it must be largely due to them that the Commercial Company's business has continued to grow, in defiance of competition and incessant changes in the character of the trade of the district. Mr. Jones has indubitably done well by the Commercial proprietary, notably in sparing capital; and they have shown themselves not ungrateful. It is a very pleasant state of things to contemplate, in a world which does not offer too many tableaux of virtue rewarded in good coin of the realm.

The Gas Man as Director—Cost of Carburetted Water Gas and Poor Coal Gas.

IF we were looking outside of London for an illustration of the advantage of having a gas man presiding over the Board of a Gas Company, Tottenham would immediately come to mind. There is in the suburbs no Gas Company that has made greater progress than the Tottenham and Edmonton during the past decade and more; and there is no Company showing greater possibilities and promise. It is true the district has considerable inherent advantages for the development of gas supply; but it is not every Board of Directors who would recognize to the full the worth of these advantages, and lend their aid in fostering and cultivating them to the utmost degree. It requires gas men to adequately appreciate the requirements and the in-and-outs of the situation, and to countenance generously the efforts of their chief officials. The Tottenham gas-works, and the possessions of the Company in the district, show evidences of princely expenditure during the past few years, and still the prospect of further considerable outlay, that would have scared many a Board who knew less of the actual necessities of the case, and who—from lack of technical training of one or more of the guiding members—could not properly read the signs of the times.

Five members constitute the Board of this Company; and, in their administrative work, they have the benefit of the advice of no less an authority than Mr. Corbet Woodall, and of Mr. D. Ford Goddard, M.P., who, although he has now for some years been separated from the profession, is a trained gas man, and at one time managed and engineered the Ipswich Gas Company, of which he is to-day Chairman. Fortunate indeed were the Tottenham Company in getting two such Directors just at the time when the district was ripe for development The handsome results that have accrued from the working by them, their colleagues, and their chief officials, of the advantages offered by the district, are disclosed in the report of the proceedings at the half-yearly meeting, as published elsewhere to-day. Mr. Woodall's addresses at the meetings, too, are eloquent, in their substance and form, as to the gain which the proprietors derive from having a man to explain their position and affairs whose knowledge of the enterprise extends from its innermost workings to its outermost bounds. It may be that Mr. Woodall does not agree with all that has been said and written on this subject of having a leaven of expert advice in the predominant administration of a gas company. Of course, much depends on the character of the gas-trained directors and their ability to work on friendly lines with the officials. But who will gainsay the statement that the technical men on the Tottenham Board are the right men in the right place, and that they have exercised—one more especially—a powerful influence on the fortunes of the Company?

For the good results achieved at Tottenham, readers must be referred to the report of the meeting; but, regarding the excellence of the balance-sheet, Mr. Woodall attributes it

largely to the use of carburetted water gas. His remarks on this head are astonishing; and they form an important contribution—brief as they are—to the controversy on the subject of water gas now proceeding in our pages. Perhaps, from the technical point of view, the information which Mr. Woodall gives on this point would be even more interesting if it went farther. There is much else that the gas engineer would like to know as to costs and other matters lying below the surprising resultant figure that he presents. However, we can only publish what he has given; but we sincerely wish he would supply the gas profession with a little more information on the point. The percentage of carburetted water gas that the Tottenham Company use is known to be considerable; their average being perhaps as high as any in the country. The quality of the coal gas made is about 13½ candles; and this is used as a diluent of 19-candle (or thereabouts) carburetted water gas, with the result that during the past year the average illuminating power of the gas sent out has been 15·90 candles. Now here is the interesting point of the tale that Mr. Woodall told the proprietors on Saturday in this connection. During the past year, this 19-candle carburetted water gas has been made at fully 2d. per 1000 cubic feet cheaper than the 13½-candle coal gas. Under such circumstances, there can be little wonder that the Directors are not anxious to reduce the quality of the gas supplied to the consumers. But, we repeat, gas engineers would dearly like an extension of this information from the manufacturing accounts locked up in the works' offices at Tottenham.

The Chagrin of Sir William Makins.

The meeting of the Brentford Gas Company last Friday is remarkable for a speech to which Col. Sir W. T. Makins, Bart., the Governor of the Gaslight and Coke Company, treated the proprietors. It was as patent as anything could well be that the opportunity for making this speech was pre-arranged, and that it was not intended only for the ears of the handful of proprietors who take the trouble to attend the meetings of this prosperous concern. We can heartily congratulate Sir William upon the adroitness he displayed in leading up to the main point of his speech, but the same congratulation cannot be extended to him in regard to the appropriateness of the occasion for making the point. What the criticism of, or the "attack" (as Sir William choses to term it) on, the administration of the Gaslight and Coke Company a fortnight previously really had to do with the adoption of the report of the Brentford Company, we cannot divine. The Governor of the former Company flattered his Deputy by referring to him as the "able and experienced" Chairman of the smaller concern; but that gentleman's ability and experience in the conduct of meetings did not show up very favourably in his neglect on this occasion to rule the remarks of his chief on the "attack" out of order, and to confine him to the motion before the meeting and the business of the Brentford Gas Company. That Sir William should have been moved to seek the comfortable, homely quarters of the Brentford meeting, where he knew that he would be surrounded by personal friends, to let fly a shaft at him whom he regards as a "hostile critic" and not a "candid friend" shows the depth of his soreness at what transpired at the last meeting at Horseferry Road. Why he should be so sore, it is hard to conceive, seeing that he contemptuously describes the followers of the leader of the "attack" on the administration as a "decimal fraction" of the proprietors.

The district of the South Metropolitan Company adjoins that of the Gaslight and Coke Company, and the district of the Brentford Company adjoins that of the big Company; and, remembering this, the sting of Sir William's opening sentence that "though he was the Chairman of a neighbour-"ing Company, he did not come to the meeting as a hostile "critic in the guise of a candid friend" will be fully appreciated. We may pass over the nice and admittedly apposite things that the Governor had to say concerning the advantages which the Brentford Company enjoy, and limit ourselves to the real point of his censure of those who have dared to derogate his and some of his colleagues' ability as gas company administrators. He forgets, or rather he choses to forget, that the criticisms at the last meeting of the Gaslight Company to which he takes exception are only part and parcel and a continuation of previous criticisms, and they must all be taken together. Those who are capable of viewing impartially those criticisms as a whole, and also the pass at which the Company have arrived, will be able to distinguish clearly (although Sir William is not) the acts of the "candid friend" rather than those "of the hostile critic." It is abundantly clear that it is Sir George Livesey's candid method of giving advice that has caused the greatest offence. The Governor doubts Sir George's good faith in his attitude towards the Company. If, he says, his criticism "had been *bonâ fide* advice to the "Board to do something which they had already left "undone for the benefit of the Company, no fault could be "found." Well, well! The transparent and only design of the number of speeches made in the Horseferry Road by the "most prominent, able, and gifted Gas Director and "Chairman," has been to show the Board those things which they have left undone for the benefit of the Company and the consumers, and to tender them advice. The competency of Sir George to do this is recognized by the Governor in the last quoted words; and yet fault is found! It is because the Horseferry Road Board have scouted the advice of years past that they find themselves in the present unenviable position of having lost the confidence of Parliament, of the consumers, and now at length of, if the Governor wills, a "decimal fraction" of the proprietors. For a long time, Sir George Livesey ploughed in this furrow alone; and the Governor by making this speech has declared his uneasiness that it is no longer so. The motive of Sir George Livesey's action is the good of the Company and of the gas industry generally. If "temporary aberration" there be, it must be looked for elsewhere.

A few words more. It is true there are members of the Board of the successful Brentford Company who are also members of the Board of the Gaslight and Coke Company. Sir William Makins noted this with pride in a second little speech on Friday. He pointed out that these gentlemen could not change their natures; and therefore if there was a comparison to be made to the detriment of the Gaslight Company, it could not be laid upon their shoulders. If the prosperity of the Brentford Company is largely due to the Board, and only in a smaller degree to the advantages which the Company enjoy (and which Sir William had previously said would naturally make the concern successful), then the obvious comment is that some of the members of the Court of the Gaslight Company might find schooling on the Brentford Board very beneficial.

Good Hopes of Cheaper Coal.

In another column will be found an article dealing with the prospect of gas undertakings obtaining their requirements of coal this year at lower prices than those ruling in the contracts now current. The article (which deals principally with the evidences contained in the Board of Trade returns for January as to the prospects of our foreign trade in iron and coal) was already in type when the latest weekly reports from the various coal mining centres came to hand; and as these reports serve to confirm very plainly the opinion we had committed to print—"that coal buyers will "be very unwise if they enter into any long engagements "upon the terms now to be had"—and considering how important it is that not merely some, but that all, gas coal buyers should exercise discretion in this matter of coal contracts, if the greatest possible reduction is to be obtained by the industry, we desire to call attention to signs already evident that coal will be cheaper this year than last.

As we have shown elsewhere, there would have already been a very decided "slump" in the coal market this winter if it had not been for the stiffening given to it by the demand for both coal and iron from the United States, whither the exports of coal last month amounted to not less than 567,400 tons—or more than 16 per cent. of the total sales to foreign countries. It is, therefore, of importance to note that all the North Country correspondents of the "Colliery "Guardian" report that "the American demand is not "maintained;" while from Glasgow we learn that "there "are practically no inquiries for the United States." This does not, of course, imply that the exports of coal to America will fall to their normal level immediately, for contracts already exist which ensure a fair shipment during this and the next month or so; but it is a very welcome sign that British coal consumers will probably not have to suffer from the coal shortage in America for much longer.

Then, as regards the actual position in the home coal market, we note that from Newcastle the report is, "Market

"quiet, prices generally weaker; gas coal 6d. a ton cheaper." The Sunderland report says: "Market very weak; lack of "orders very noticeable; one or two collieries laid idle in "consequence of absence of trade." At Middlesbrough, a "decidedly easier feeling" is noted, and gas coal is reported to be "rather weak," a few contracts having been made at "slightly lower prices than were secured at the same time "last year." (In our opinion, the buyers should not have been satisfied until the word "substantially," and not merely "slightly," was the right adverb to use.) Darlington reports that the position is "disappointing. Gas coals, which "were holding their own, have now given way materially;" while the price of house coals was reduced during the past week, although it is unusual to make any change therein except at the end of a month. At Barrow, "competition is "keen;" the position "does not improve" in Leeds; trade is "not particularly brisk" in Sheffield; while at Birmingham "quietude continues, and the coalowners are complaining of inactivity." Are not these omens sufficient to encourage hopes of cheaper coal this year—as some compensation for the lamentably mild weather (lamentable from the gas maker's point of view) that is playing no small part in bringing it to pass?

The Lesson of Marylebone.

THE attention of those who are responsible for the security of gas property and its protection against the covetousness of local authorities should be given to the developments of the situation in the Metropolitan Borough of Marylebone, which has already been described in our "Electric Light-"ing Memoranda." This is, in brief, a case in which the "principle" of Municipal Trading has come into violent collision with all the facts that go to compose a proof of expediency; and the present question is as to what will be the outcome. If regard is had to the failure of the proof of expediency, complete collapse must overtake the "principle." On the other hand, if the believers in the principle, who have had all their own way so far, carry their point, the ratepayers of Marylebone will be saddled with an undertaking which must be heavily subsidized out of the rates, while the consumers of electricity will not only not receive the smallest benefit from the change of proprietary, but must abandon all hope of ever getting such a reduction of price as the other customers of the Company will certainly enjoy in the future. The present dilemma has been brought about simply and solely by the indulgence of the Borough Council in a spirit of prejudice against the Company, such as gas companies have only too often to suffer. When electric lighting companies started in London and the principal English towns, they were welcomed with effusion by many local bodies who had not a good word to say for the gas companies with whom they had business relations. Nothing was bad enough to be said of the one, nor flattering enough for the others. Wise men who were experienced in the manners and customs of local politicians smiled grimly at the spectacle of the electrical lambkins playing in the sunshine of municipal admiration, well knowing that the time would come when the lambs would be considered ripe for slaughter.

Certain parochial busybodies in Marylebone very early began to find fault with the electricity supply which fate and circumstances had allotted to them. The Company were pioneers, and had their troubles, which the large sphere of their operations rendered very conspicuous. There was one winter during which the powers of the Company were over-taxed, and the Marylebone customers appear to have suffered considerable inconvenience. The Company rose to the occasion, and adopted the policy of the gas companies before them, in moving their generating station outside the area of consumption, so that there should be no further difficulty in providing an ample supply. Thereupon the Marylebone authority thought they would like to start in the business on their own account, only to learn that the limited possibility of competition in electricity supply left open by the Act of 1882 did not include that of public money with private capital. They were informed by the higher powers that if they wished to go into electric lighting they must first buy out the Company in the district; and, subject to this condition, an Act of Parliament was obtained. Of course, those who pushed the borough on to take this course lost no opportunity for vilifying the Company, and consequently a presumption was created that the bad terms on which the Borough Council professed to be with "this "oppressive monopoly" were justified. The Arbitrators' award has effectually opened the eyes of the ratepayers to the realities of the case. The amount awarded (nearly £1,250,000 sterling) sufficiently indicates the value of the property which a handful of insensate busybodies vainly sought to depreciate; and it satisfactorily proves—what some had almost begun to doubt—that justice to the rights of individual property is still to be had in the land.

There is solace in this award for everybody except those who are accustomed to join in the parrot-cry of "Progress" whenever a local authority plunge with the ratepayers' money into any sort of speculative enterprise. It must help to enlighten the more thoughtful members of municipalities everywhere as to the true bearings of local supply finance. If it were only generally agreed that questions of the kind now under consideration are essentially matters of expediency, there would be no ground for further controversy on the subject. Once let it be clearly understood that mere empty clamour in town councils, or japes in a cheap newspaper, are inadequate to successfully attack an investment of private capital in a public supply undertaking which has been created under the protection of the law, and is being properly carried on with every prospect of enduring prosperity as its reward, and less will be heard of the "principle" of Municipal Trading; while the public will never miss it.

A Municipal Scandal.

SINCE the publication some months ago in "The Times" of the now famous series of articles on "Municipal Socialism," those who advocate the placing of everything possible under the control of the local governing bodies of the kingdom have received no blow so heavy as that administered by the recent issue of the first report of a Departmental Committee appointed a year ago by the Dublin Municipal Council. The object of the Committee was to investigate the working of the departments of the Council, and ascertain whether by any means greater efficiency or economy might possibly be obtained. This Committee very soon found that they had taken on a much bigger task than was anticipated; and the result is that they have felt compelled to unbosom themselves of the knowledge so far obtained, without waiting for the conclusion of the inquiry. There still remain several important matters to be investigated, and these they are determined to look into without delay; but it must be admitted that they have already brought together quite enough facts to constitute one fairly strong dose for the Council and their constituents. In another column of the "JOURNAL," we notice the first portion of the report of the Committee, and shall hope to refer to the remainder next week.

Though nearly two columns have been devoted to the matter, we have been unable to do more than touch upon the most important points. These, however, sufficiently indicate the trend of the discoveries, which are of a startling character. Almost every possible weakness of municipal government seems to be revealed, with none of its strength. That such a state of things should have existed as is brought out by the report, is disgraceful; but, inasmuch as it does so exist, the Committee have taken the boldest as well as the wisest course in exposing the whole miserable scandal to the searching light of public opinion. No eventual harm can come of this step, however much it may for a time damage the credit of local governing bodies generally. On the contrary, much good must result, if the Committee's recommendations (with which we shall deal in the second article) are faithfully carried out. These recommendations, which are of a somewhat sweeping character, have been adopted by the Council; and it is to be hoped, both for the sake of the credit of the city and of the pockets of the ratepayers, that every possible effort will be made by the members to fall in with the views of the Committee.

There is need for thorough and drastic reform, if the Council are to rehabilitate themselves in the position from which this investigation has so rudely thrust them. Much of the evidence given is of a very ugly character, and reveals an almost incredible condition of affairs. Abuses and extravagance everywhere! Of a surety, the Committee of Inquiry did not have to go far before they found means for increasing the efficiency and economy of the different departments. There are clerks for whom, as the Committee remarked, work had evidently to be made, so that they might not sit idle; and there are workmen almost (some

even totally) incapacitated, from age or other causes, who are kept on at full pay, for want of some superannuation scheme. Then, again, there are men who were taken on for certain work, and who, after the job was finished, were kept on waiting Micawber-like "for something to turn "up" for them to do. But worse than all this is the fact, which was admitted by one of the officials in evidence, that pressure is constantly being brought to bear upon him by members of the Council and others to give employment to persons whom they recommend. This may be all very well for the few fortunate enough to secure such employment; but what about the many who have to pay? Apart from all considerations of morality, there is a pounds, shillings, and pence aspect of the question which should appeal even to those with the loosest purse-strings.

It must not be thought, because we so often find ourselves at variance with the policy pursued by "Progressive" municipalities, that the chronicling of such a scandal as this Dublin affair causes any feeling of triumph. So far from this being the case, we have experienced considerable pain, and no little shame, in thus referring to this indictment of the municipal government of the Irish capital; and the City Council and the Inquiry Committee have our heartiest good wishes in the honest attempt they are now making to eradicate abuses which, if persisted in, would sooner or later render the system totally unworkable. Indeed, we must protest strongly against one statement made by the Lord Mayor, when introducing the Committee's report to the Council—that is, where he gave it as his deliberate opinion that the business of the Corporation was quite as well managed as that of most municipalities in the United Kingdom. There may be some others who mismanage their affairs to the same extent as has been proved to be the case in Dublin; but that the majority do so we do not, and will not, for a moment believe. Let the ratepayers—for they are all-powerful—see to it that such blots as do exist are speedily removed.

Sir J. Gorst's New Prescription for Municipalism.

As a statesman, Sir John Gorst is apt to take his hearers' breath away. Speaking at Lancaster recently, he set himself to deal with some aspects of municipal activity; and it is to be supposed that, if he had been a Progressive, he would have had a good deal to say about the satisfactions of municipal trading at a profit. So far as may be gathered from the newspapers professing these principles, money-making seems to be accepted in some quarters as the be-all and the end-all of municipal progress. But Sir John Gorst thinks differently. He is a member of a Government which has made the instruction of youth a municipal duty; and he told the Lancashire people that the local authorities should make the general welfare of the child population their special care. What is the use of municipal gas supply, and electric lighting, and tramways, while the people are so inferior that out of 11,000 recruits offering themselves for the Army in Manchester, only 1000 were fit for the service? The spirit indeed is as good as ever; but the body has suffered wofully from the conditions of life under the reign of the Manchester school of economists. This is a matter which, according to Sir John Gorst, should be a subject of local administration. A strong force of public opinion is wanted, to back up local authorities in demanding fuller powers to look after the welfare of the people. "If the people would rise to "their own interests, and see that what was good for them "was really carried out, they would be able to elect local "authorities, and persuade them to appoint officers and other "persons by whom such reforms as were necessary for the "social welfare of the people could be carried into effect." Alas! the question is: What is good for the people? In Lancashire, it has been thought that child labour in the mills is the correct thing. At any rate, a municipality with such an awakening speech as this of Sir John Gorst's before it should find better occupation than peddling.

Parliamentary Agents and Commissions to Town Clerks, &c.

We have reason to know that the references to the above subject in the last two issues have made a little flutter Westminster way; and this is not surprising, seeing that the work emanating from the interests the "JOURNAL" serves forms a no mean proportion of that which must of necessity pass through the hands of Parliamentary Agents. It is not an agreeable task to call attention to matters of this kind; but the "JOURNAL" has its duties to perform, and must perform them without fear or favour. One of these duties has been and is to assist in the effort to maintain a high degree of purity in public service. When this question of the payment by Parliamentary Agents of large commissions to the clerks of local authorities was so prominently brought forward, we were loth to believe in its general existence; and hence the remark previously made that it would be interesting to hear what Parliamentary Agents had to say regarding Mr. Campbell Swinton's accusation. It was a pleasure to receive the two letters published last week; and it is an even greater pleasure to receive the letter, and the assurance it contains, which appears in our "Correspondence" columns from no less an authority than Sir Theodore Martin, K.C.B., who is the *doyen* of the profession of Parliamentary Agents. It is a great satisfaction to learn from him that the disreputable practice of paying commissions can only be charged against a "limited number" of Parliamentary Agents; and we trust that those who blemish the honour of an honourable profession will quickly receive their deserts by the discovery of their odious dealings by the local authorities who employ them to look after their interests. The letter of Sir Theodore Martin will be read by many interested in local government; and the hope is sincere that it will have good effect in bringing about the return of clients to those who "have suffered, and do now suffer, by the loss of old and valuable clients, whose business has been transferred to agents who give allowances of more or less liberal commission."

A Word to American Gas Engineers.

In the recent controversy on "the other side" on the subject of Inclined Retorts *v.* Horizontal Retorts, there were some differences of opinion as to what were the real views on the question of certain engineers of the Gaslight and Coke Company. But that is a matter we are not going to discuss here. All we want to do is to direct the attention of our American friends to a statement made by the Governor of the Gaslight and Coke Company (Sir W. T. Makins, Bart.) in a speech at the meeting of the Brentford Gas Company last Friday. He was talking of the advantages which that Company possessed in comparison with—well certain other companies; and he stated his belief that one reason why the Brentford Company were, and had been, so long prosperous, was that they were the pioneers in the inclined retort system, "by which they had reduced the cost of carbonization, as regarded wages, to the tune of 50 per cent." When we find the head of the governing body of the Gaslight and Coke Company speaking in this strain, it does not look as though he, at all events, regards the inclined retort system with an unfavourable eye. Of course, Sir William Makins is not an engineer; but he prides himself on being a good gas company administrator. And after all it is not necessary for a man to be an engineer to make a simple arithmetical calculation.

Seventy Years' Coal Prices.

Though there are perhaps not many matters in respect to which gas manufacturers were better off in the first half of last century than to-day, Sir W. H. Stephenson, the Chairman of the Newcastle and Gateshead Gas Company, produced figures at the recent meeting of the shareholders which prove that there is at least one—the price of coal. A glance at the rates paid by the Company for coal during the last seventy years shows that the "good old days" were not altogether the "fraud" that people are apt to imagine. The following are the average prices of coal, delivered in the retort-house, of each five years over this period: 1833-1837, 5s. 0·59d. per ton; 1838-1842, 5s. 2·62d.; 1843-1847, 4s. 8d.; 1848-1852, 5s. 2·95d.; 1853-1857, 6s. 2·54d.; 1858-1862, 5s. 5·65d.; 1863-1867, 6s. 6·98d.; 1868-1872, 6s. 6·50d.; 1873-1877, 12s. 3·52d.; 1878-1882, 8s. 0·76d.; 1883-1887, 6s. 5·92d.; 1888-1892, 8s. 5·14d.; 1893-1897, 7s. 2·74d.; 1898-1902, 10s. 4·47d. In 1902, the cost was 9s. 7·74d.; while in one year of the period 1873-77, the price paid was 17s. 1·02d. per ton, and the Company had to go to Parliament for special powers to increase the price of gas. The latter figures do not compare very well with the 4s. 8d. average for the five years ending 1847; and a return to old prices under present-day conditions would be extremely pleasant. A

reversion to former rates for coal and old conditions of manufacture, however, would soon teach us how much we now have to be thankful for, in spite of the dearness of the raw material. The cost of coal and the vagaries of the weather were about the only things the Chairman of the Newcastle Gas Company had to complain of. In all respects, the undertaking is in a most flourishing condition; and the go-ahead policy pursued by those in authority, cannot fail to maintain—and should even increase—this state of prosperity. With regard to the weather, the Chairman referred to the extraordinary fact that in Newcastle there was hardly any appreciable difference in the temperature on the longest and shortest days of last year; the minimum readings having been 47·2° and 47° respectively. Such perversity as this will soon reduce "summer consumption" and "winter consumption" to meaningless terms, so far as gas used for heating purposes is concerned.

A Creditable Performance at Ipswich.

When presiding at a recent meeting of the Ipswich Bridge Ward Liberal Club, at which the question of the advisability of municipalizing monopolies was under consideration, Mr. W. Reavell referred in laudatory terms to the local gas undertaking. Everyone, he said, knew how valuable a concern it was; and owing to the excellence of the management, it was a byeword that Ipswich gas was cheaper than that of any other place in the Eastern Counties. The Company had created an extremely good property, for which the town would have to pay a large sum, if they wished to own it. Nevertheless, he thought that such an expenditure would be justified. As to whether or not the ratepayers would do well to acquire the works, is for them to decide. But no one reading the account of the proceedings at last week's meeting of the Company can fail to see what a prosperous condition it is in. For this, good management is in a very large measure responsible; and therefore the Chairman (Mr. D. Ford Goddard, M.P.) and the Secretary and Engineer (Mr. J. T. Jolliffe) are to be congratulated. The former gentleman treated the shareholders at the meeting to a highly interesting history of the progress of the undertaking since its establishment in 1817—though the first Act was not obtained until 1821, when the capital authorized was £14,000. In the following year the works were removed to their present site, and the town was first lighted by gas. Since that date, the Company have been three times in Parliament; the total authorized capital being now £175,000. Unfortunately much of the early work of the Company has become lost in obscurity; but it is on record that in the year 1861 the output of gas was 46 million cubic feet, while last year it was no less than 340 millions. So that, though it took them forty years to reach the first-named figure, in the succeeding like period the output had increased more than sevenfold. An analysis of the increases in periods of ten years from 1861 is interesting. From 1861 to 1871, the growth of the output amounted to 80 per cent.; from 1871 to 1881, to 56 per cent.; from 1881 to 1891, to 38 per cent.; and from 1891 to 1901, to 80 per cent. In 1821, the charge was 10s. per 1000 cubic feet, in 1847 it was 8s., and to-day it is 2s. 8d. Bearing all these figures in mind, it is not to be wondered at that the Chairman felt himself justified in assuring the shareholders that they need have no anxiety as to where their future profits were to come from, and that Mr. Reavell should refer to the undertaking as being an extremely valuable and well-managed concern.

Figures Worth Remembering.

To be a good advocate, one must be well primed; and if gas engineers and managers are not now well up in real illustrations of the extraordinary cost of electricity for public purposes as compared with incandescent gas lighting to assist them in maintaining and furthering their own interests, it is not the fault of the "JOURNAL." In this week's issue will be found an article which gives some concrete facts from the City of Westminster, and which shows the comparative cost of incandescent and flat-flame gas lighting and electric lighting. The two large tables will supply figures as to actual costs for installation, sinking fund, maintenance, and annual costs per lamp; but, as explained in the article, we do not place any reliance on the figures as to the cost per candle power per annum or the cost per candle-power-hour. The small table will be found of particular value to the gas manager; showing, as it does, how, as local authorities push further and further into street lighting by electricity, so the expense—however regarded—grows at a remarkably rapid rate. At the same time, we should be sorry for any unfair use to be made of this table. There is the point of efficiency to be considered; but people have different views as to what efficiency in public lighting means. Efficiency does not mean going from one extreme to the other; and that is just what the parish of St. George's has done, to the end that the street lighting there by electricity costs upwards of £300 *more* per mile than the street lighting of St. Margaret's by incandescent gas lighting. What could an intelligent gas lighting engineer do with that extra £300 in the streets of St. Margaret's if he had the chance, and the expenditure was really required? Another instance of a deplorable rise in expenditure on public lighting is to be found at Islington. It was referred to in a modest little paragraph in the "JOURNAL" for Feb. 10; but a few additional particulars have since come to hand. The cost of public lighting has gone up from £14,645 in 1894 to £33,314 in 1903. This is "due mainly to the introduction of electric arc lighting." But, large as the figure is, it does not represent the whole cost, as the price of 3½d. per unit which is charged for the current supplied to the public lamps is under cost price, and represented last year a distinct loss of £4900 to the electricity undertaking. In 1889, the proportion of rate assignable to lighting was 1·50d.; in 1894, 2·25d.; in two years since it has been down to 2d.; but from 1898 (when the figure was 3d.), there has been a gradual rise to 4·26d.! These are startling figures, and worth remembering.

A Fair Sample.

Following up the remarks we made a fortnight ago with regard to the advisability of gas companies in England availing themselves more largely than they have been in the habit of doing of the medium of the newspaper press for advertising the commodity they have for sale, we notice in a Newmarket paper a boldly set-out announcement by Mr. J. H. Troughton of "A fair sample of what can be saved by using incandescent gas-burners." The sample (which refers to the lighting of St. Mary's Church, Newmarket) is certainly calculated to attract attention. It is stated that in 1900, with flat-flame burners, the lighting account of the church was £20 6s. 9d.; while in 1902, with incandescent burners, it was £4 19s. 8d. To the latter item, however, has to be added the cost of renewals (13 mantles) during the year, 6s. 6d.—thus showing a saving of £15 0s. 7d., or 75 per cent., besides furnishing about twice the amount of light. Mr. Troughton follows this up by giving particulars of the terms on which his Company undertake the maintenance of incandescent gas lights, and explaining exactly what the system means. This is the sort of advertising which, it seems to us, must pay for itself over and over again.

Ventilation of Electrical Conduits and Boxes.

In the proceedings arising out of the Panton Street explosion reported in the "JOURNAL" recently (p. 295), the Jury, in awarding the plaintiff £150 damages, condemned as inefficient the present system of ventilation by B.I.W. covers. It was urged by the defendants that an upcast system of ventilation of electrical boxes and conduits, though more efficient than the present cover, was impracticable, and altogether too costly for general adaptation. Mr. G. Burstall, the expert called on behalf of the Company as to the efficiency of their plant, admitted, however, that an upcast shaft system of ventilation, with or without fans, was undoubtedly the best-known means of removing explosive gases; but he demurred to the practicability of adopting it—making the somewhat startling admission that the Company did not possess statutory powers for the erection of shafts on private property. He further volunteered the statement that wayleaves were extremely difficult to obtain. He was subjected to severe cross-examination, and reluctantly admitted that St. Pancras had adopted a short standard upcast ventilating shaft in their boxes, and that Glasgow, with its proverbial municipal sagacity and enterprise, had also installed the system—the borough of Falkirk following the lead of the latter. It cannot be controverted that this, the best-known practicable means of removing explosive gases, may occasion some considerable outlay in installation; but the sooner electrical undertakings awaken to a due sense of

their responsibilities, the better for the public and their own workmen, both of whom have, in the past, suffered grievous hurt by the far too frequent explosions in street boxes and conduits. The conductors of electrical undertakings cannot plead poverty as a valid answer to their policy of negligence and indifference on this vital question of ventilation; and their exchequers will bear the burden imposed upon them without seriously mulcting the shareholders. It must not be overlooked that, at the outset, compulsory powers should have been sought for the purpose of affixing upcast shafts where necessary on either public or private property, at a reasonable nominal acknowledgment per annum; and this is the only course now open to all electrical undertakings. A short Bill embodying these details could be carried through both Houses without encountering any real opposition. That which would appeal most to every commoner or peer is, broadly speaking, the safeguarding of the lives of the public, the minimizing of danger to workmen, and—what, perhaps, is equally important—an estoppel on damage to property.

More of Thorium.

The statements made on the subject of thorium in the article last week on "The Position of the Incandescent Trader" were apparently not too strong. We have no knowledge as to who constitute the "Syndicate for the Protection of the Interests of the Incandescent Gas Lighting Industry;" but there is such a Syndicate in existence in Berlin. From that organization, a circular has emanated, and a copy has been sent us by some esteemed correspondents in Germany. It states that the Syndicate are compelled to inform all firms buying or using incandescent mantles that, during the last few weeks, the market price of nitrate of thorium has risen very considerably. The letter proceeds: "Taking into consideration the positive information we have got relating to this business, and the present attitude of the thorium manufacturers (who, even at the actual extremely high prices, decline accepting orders of more than three days term of delivery), it is to be supposed that a further rise in prices will shortly take place. As matters stand, we shall be compelled to also augment the prices of mantles in proportion." We need not, in view of the article last week, make any comment upon this confirmation of the statements then made. We fancy the position of affairs is causing a little increased excitement in the incandescent trade here, judging from the visits that gentlemen who have business relations in this line with Germany have been making to that country during the past few days.

An Irish Strike.

High hopes are being raised with regard to a discovery of oil made a few weeks ago on premises situated in the very heart of Dublin. The discovery occurred in the basement of an ordinary dwelling-house, which is built on sloping ground, and stands 20 or 30 feet above the surrounding level. When the oil was first noticed, it flowed copiously for three days; after that it slowed down for a day or two; and since then it has increased again in volume, and continues fairly productive. In an interview with a representative of the "Westminster Gazette," Mr. Henry, the Editor of "Petroleum," stated that he has great faith in the find, and that from a casual glance the oil appears to him to be of very fair quality. It is not crude or liquid fuel oil, but is white, contains a large percentage of water, and smells strongly of paraffin. The land upon which the oil has been found was reclaimed from the bog; and this fact, Mr. Henry says, lends an added interest to the discovery, inasmuch as experts have for a long time past suspected the presence of oil in Irish bogland. Nothing definite, of course, can be said regarding the value of the find, until further investigations have been carried out; and it is early days yet to talk of Irish oil wells. But the progress of the tests will be watched with considerable interest, for it is impossible to overestimate the importance, both to ourselves and to our neighbours, which would attach to the opening up of a really productive oilfield so near home. Unlike most strikes, this one is fraught with possibilities of great benefit to the community.

Valuable Corroboration.

The evidence which the "JOURNAL" is from time to time able to put before its readers regarding the successful competition of incandescent gas with electricity for street lighting, should be convincing enough for anybody; but still there is always a possibility of people outside the gas profession looking upon what appears in our columns as biassed—at any rate, to some extent. It is, perhaps, only natural that such persons should—with reference to statements which favour gas—place greater reliance on anything they may read in the leading London dailies; and therefore we cordially welcome the following remarks, which occupied a prominent position in a recent issue of the "Pall Mall Gazette:" "Since the exposure in the 'Times' of the results of extravagant municipal trading, a degree of caution has been noticeable in London Local Councils in the matter of municipal enterprises. The electric lighting fetish, for instance, has fewer votaries to-day than it had some months ago; and some schemes are hanging fire in consequence. The Tottenham Electricity Committee only carried a scheme of development last night by a majority of one in the Council; and the Stoke Newington Council had to listen to protests from a strong ratepayers' deputation against an Electric Supply Bill which the Council are putting forward. The fact is that the use of electricity, especially for street lighting, is not as fashionable as it was before incandescent gas lighting was invented; and it is much dearer. The protest of the Stoke Newington ratepayers was unavailing; but it may prove to be justified when the Council come to pay the bill for their electric undertaking." This is a statement of fact which we have no doubt will be well pondered over, having regard to the quarter from which it emanates.

A Plucky Child Prevents an Explosion.

It is a generally recognized fact that the average adult, even when possessed of some slight knowledge of gas matters, adopts the certain, but unwise, method of searching for an escape of gas with a light, seldom having the common sense, notwithstanding all that has been written upon the subject, to adopt more rational methods. Cases occasionally occur, however, which indicate clearly that the younger generation are growing up with more presence of mind and thoughtfulness—at all events in this respect—than their elders. Evidence of this has just been brought to our notice. A few evenings ago, a youngster ten years of age called at a gas inspector's office and lustily rang the bell. On the door being opened, a child was found thoroughly out of breath and sobbing bitterly. When he was able to speak, he informed the inspector that he had been roused from his sleep, when lying in front of the fire, by his sister, a child of thirteen, who, in lighting the gas in the kitchen, had somehow pulled down the hanging pendant. She had jumped on to the table, and was holding her finger against the open end of the pipe, shouting to her brother to come to her assistance. She at once sent him off to the offices, about half-a-mile distant, while she herself kept the gas from escaping in the way described. The inspector hurried back with the lad, and soon put things to rights. Here was an instance of thoughtfulness and pluck which one does not often meet with; and it is certainly worth placing on record. And it should at the same time be stated that the children's action did not go unrewarded. Many adults might profit by this example of a child's sagacity.

WATER AFFAIRS.

"Bearing" the London Water Supply.

AT their meeting last Tuesday, the London County Council made a substantial addition to the list of members of the Metropolitan Water Board, which has been gradually increasing in length since the first appointment of representatives was made a few weeks ago, in compliance with the circular addressed by the Local Government Board to the various constituent authorities towards the close of the past year. The Board is now, therefore, taking shape; and it may be presumed that before very long it will be fairly at work. The first business will be to acquire by purchase the undertakings of the Metropolitan Water Companies and Staines Reservoirs Joint Committee; and the Board will have to do this by the 24th of June next year, or such

later day as the Local Government Board may appoint. The important duty of fixing the price to be paid is, as readers are aware, entrusted to three Arbitrators, whose position, one would suppose, would be such as to ensure a thorough investigation into the condition of the property to be acquired. The Board of Arbitration, as constituted by the Metropolis Water Act of last year, represents a combination of judicial, administrative, and engineering ability of very high order; and it would be impertinence to suggest that the members would be influenced even in the slightest degree by outside criticism or advice. Nevertheless there are not wanting indications of a desire in certain quarters to depreciate the value of the London water-works—or, more strictly speaking, the sources upon which they depend for their supply. Paragraphs couched in somewhat alarming language about "London's diminishing supply" have lately made their appearance in the papers, and were promptly followed by the discussion at the Sanitary Institute to which reference was made last week.

Considerable attention has since been given to a report by the Chief Engineer of the London County Council (Mr. Maurice Fitzmaurice) dealing with the diminution in the volume of water in the Thames and Lea, as well as in the yield from the chalk. But there is nothing particularly new in the report. Everybody who has studied the subject knows that there is at present shortage of water, and that it is due largely to deficient rainfall—in fact, so much is admitted by Mr. Fitzmaurice; and had it not been for the ample storage possessed by the London Water Companies, provided in the face of constant opposition from the County Council, the Metropolis would have suffered in consequence. This point was emphasized by Mr. Whitaker in opening the discussion above referred to. We are not prepared to dispute the statements which have lately been made as to the diminished flow of the Thames; but we encourage the hope that a cycle of wet years is approaching which will increase the bulk of water both in that river as well as in the River Lea.

Meanwhile, we learn that there is now before the Board of Trade a proposal which, if carried into effect, will tend to conserve for public use a large volume of water in the Upper Thames. It is a scheme to construct a barrage or dam and locks at Gravesend, to maintain the lower part of the river always at Trinity high-water mark. The water which would be conserved now runs to waste, because it is needed to scour the river. As to the feasibility of this scheme we are not prepared to speak; but, whatever effect it might have in improving the future water supply, we decline to believe that the condition of the present is such as to justify the depreciatory terms which are now being freely applied to it. "Bearing" may be a very successful operation when performed in Capel Court; but we question if it will be of much use in the home of the London County Council in Spring Gardens.

Moorland Water and Lead-Poisoning.

One of the most valuable reports which have emanated from the Local Government Board was issued early last week. It is by Dr. A. C. Houston, who supplements therein the papers on lead-poisoning and water supplies submitted by the present Chief Medical Officer of the Board (Mr. W. H. Power, F.R.S.) in 1887 and 1895 by a voluminous treatise on the action of moorland waters upon lead. Many of our readers are, no doubt, aware that nearly twenty years ago some cases of lead-poisoning which occurred in Sheffield led to the water supply being subjected to examination by Dr. Sinclair White, the Medical Officer of Health for the borough, who found that it was acidity in the water which imparted to it the power to dissolve lead. His researches, however, fell short in a very important particular—they did not reveal the cause of the acidity. The subject was taken up by Mr. Power, who came to the conclusion that this baneful characteristic of moorland waters is produced by the life processes of bacteria found in moist peat. This was an important advance; and it was followed up by Dr. Houston, who identified two varieties of these creatures. His exhaustive account of his investigations is prefaced by a short explanatory report by Mr. Power, who states that prolonged investigation into the causes which give to water its lead-dissolving property—for which he finds it convenient to retain the descriptive term "plumbo-solvency, though he acknowledges that there may not be sufficient orthographical or other warrant for it—has shown that a great deal of uncertainty existed with regard to the conditions which increased or diminished the liability of a given moorland water to act upon lead pipes; and that this uncertainty called for the consideration of a number of biological as well as chemical questions. This inquiry was entrusted to Dr. Houston, who sets out in his very interesting report the principal conclusions to be drawn from his researches. The first part contains records of sustained observations at the moorland gathering-ground selected at Burnmoor, the water from which, converging in a particular stream, feeds a reservoir supplying the little town of Bentham, lying about a dozen miles to the north-west of Settle, in a district which has for a long time been troubled with cases of lead-poisoning. In the second part he deals with the results obtained when the experience gained at Burnmoor was applied to the moorland gathering-grounds of 23 water-works in Lancashire and Yorkshire; and in reference to them Mr. Power says the recorded observations "deserve careful considera-" tion from those responsible for the purity of the supply " derived from these areas."

It is impossible to give here more than a general indication of the results of Dr. Houston's valuable researches; leaving all who are specially interested in this subject to procure the volume containing them. We may say, however, that out of 58 reservoirs serving the districts examined, "no less than 35 contained acid water possessing, in greater "or less degree, plumbo-solvent properties." This condition was traced in many cases to peaty streams or feeders, some of which were remarkable for their acidity. This, however, was found to vary in degree—being sometimes entirely absent in the case of waters usually acid, and at others present in those generally neutral. These variations depend upon the proportion of peaty water which finds its way into the several sources; and Dr. Houston emphasizes the importance of "considering the antecedent "rainfall in relation to the reaction of moorland streams." In the case of those gathering-grounds which rely mainly, but not solely, upon storm water, care should be taken that the water which drains from them in time of drought, or even during the ordinary conditions of rainfall, is not plumbo-solvent.

Dr. Houston has brought us face to face with the evil, let us see what he suggests as its remedy. Referring to the 35 reservoirs already mentioned, it is stated that in every case the acidity was removed by filtration through sand, by the addition of neutral or acid-neutralizing water from different sources, or by some other means. He found that filtration through beds of stone and sand covered with limestone and chalk was less satisfactory in practice than might have been expected. He, however, is inclined to believe that ordinary sand filtration, with the addition to the filter of some neutralizing material—for example, a thin coating of lime on the surface of the sand, with limestone underneath the sand—and the subsequent addition of a trace of sodium carbonate to the neutral filtered water, is the best method. As a practical outcome of his inquiry, he urges that the circumstances of every water supply of moor land origin should be considered with reference to the factors of plumbo-solvency existing upon it; and the nature of these factors, and their relative importance, he has endeavoured to make clear in his report. In the case of existing works, it is advisable to test the water, not only in the main streams, but also in the tributaries and the subsidiary feeders, during different seasons of the year and under ordinary and extraordinary conditions of rainfall, in order to arrive at a satisfactory conclusion as to the liability of the supply in general, and of its constituent waters, to acquire plumbo-solvency. In the case of proposed new works, his inquiry indicates the necessity of a careful survey of the physical characters of the gathering-grounds, as well as of ascertaining the proportion of spring water to surface water at different times in the course of the year and under varying conditions of rainfall, and also of testing the acid-neutralizing power of the former, and the general quality of the latter, especially during wet weather and sudden storms following a period of drought.

In addition to plumbo-solvency, certain waters possess the property of producing disintegration of the surface of lead pipes similar to the action of rust upon iron. It is called their "erosive ability." This action, however, is one which concerns the engineer rather than the medical officer; and the results of inquiries made with regard to it are left

for a second volume. In the one just issued, however, there is sufficient to occupy for some time the attention of all who are specially interested in the subject-matter of its contents.

Refusal to Sanction a Water-Works Purchase Scheme.

A somewhat unusual course has been taken by the Local Government Board with reference to the application of the Worksop Urban District Council for sanction to the purchase of the local water undertaking. A public inquiry was held last December by one of the Inspectors of the Board, at which there was practically no opposition; but in spite of this fact, the Council have now received an intimation that sanction to the purchase must be withheld. This is rather a staggerer to the Council, and one member promptly put it down to the municipal policy of "The Times," which was "apparently influencing the Local Government Board." With the greatest respect to our contemporary, we do not think that it is in any way responsible for the rebuff which has been administered to the ruling body at Worksop. The Board were able to give a very good reason for their course of action, without any assistance from Printing House Square. It seems that the assessable value of the town for general district purposes is only £52,000, and that the existing debt (which includes £7000 for a cemetery, £4500 for a cattle market, and £24,000 for electric lighting) very nearly equals this amount. This, and the price the Council were likely to have to pay for the water-works, is what "influenced" the Board in coming to the decision they did. The members were under the impression that they could incur a debt of twice the assessable value before having a check put upon their career; but they have found themselves sadly mistaken. In spite of the advice of the local paper, that they should "accept the position with grace," the Council do not seem at all inclined to give up the idea of acquiring the undertaking. However sound the principle may be that the supply of water should be in the hands of the local authority, and however valuable may be the undertaking of the Worksop Water Company, we hail with unalloyed pleasure this sign that the Local Government Board intend to put some sort of rein to the apparently insatiable desire of municipal bodies to increase the burdens under which the ratepayers in almost every part of the country are already groaning.

A Daylight Photometer.—Mr. A. Campbell calls attention, in "Nature," to a photometer described by Mr. A. H. Munsell, of Boston (Mass.), which has been designed mainly for the comparison of the brightnesses of various coloured surfaces illuminated by daylight or artificial light. The instrument consists essentially of two "cat's-eye" shutters placed symmetrically towards a source of diffused light. Through one of these the light falls on the coloured surface to be tested; and through the other, on a standard white surface. The second shutter is then gradually closed until the resulting grey produced on the white screen just matches the coloured surface in intensity, while a dial connected with this shutter shows, in percentage, how much darkening has been necessary to match the coloured surface under test. The instrument has also been applied to the testing of light transmitted through coloured media. Owing to the wide variation in the sources of light used, as well as in the colour perceptions of different observers, Mr. Campbell says, no degree of absoluteness can be attached to the readings.

Utilization of Waste Products.—About twelve months ago, the Leeds Corporation gave permission to the Chairman of the Gas Committee (Alderman Lowden) to erect, at the New Wortley Gas-Works, temporary plant for the purpose of experimenting with an invention of his for the profitable utilization of certain waste municipal products, such as foul gas lime and clinkers and refuse from the Corporation destructors. The experiments have, we are informed, proved so successful that it may be possible shortly to publish full details. The object has been to produce a serviceable and economical brick for building purposes and pavement slabs. The foul lime is first converted into a material which is capable of admixture with the other constituent parts of the commodity; and the refuse and clinkers, having undergone similar preparation, are added—great pressure being exerted to ensure a satisfactory result. In conjunction with the Manager of the works (Mr. John Bond), Alderman Lowden, who is the sole inventor and patentee, has charge of the experiments; and the Sub-Gas Committee are reported to be so well pleased with the progress effected that there are hopes of turning the process to useful account in Leeds, if, as expected, it fulfils present expectations. All the experimental work has been done by Mr. Bond; and should the process prove successful, it will be due in large measure to the ability and perseverance he has displayed, and to the improvements he has suggested from time to time.

ESSAYS AND REVIEWS.

THE PROSPECT OF CHEAPER COAL.

The Board of Trade returns for the month of January, like their predecessors for some months past, have for their outstanding feature the influence of the situation in the United States upon the iron, steel, and coal markets of this country. The exports of iron and steel to America last month amounted to 59,100 tons, as compared with 17,800 tons in 1902, and 7300 tons in 1901; and as the increase in the total net exports to all countries amounted to 63,200 tons over 1902, and 43,300 tons over 1901, it will be seen that, but for the American demand, our foreign trade in iron and steel would have remained at about the very modest level of (say) two years ago. This increased exportation of iron and steel last month may be estimated to have affected the consumption of coal in this country to an extent equal to from 1½ to 2 million tons per annum. But that indirect effect upon the coal market here is a small matter compared with the direct influence upon it of the actual shipment of coal to the States, which last month was far greater than in any month of recent years. In the first nine months of 1902, the exports of coal to America amounted to 141,400 tons, as compared with 108,000 tons in the same period of 1901—an immaterial increase. In the last three months of 1902, the exports reached 739,100 tons, against 23,800 tons in 1901—an average increase of under 240,000 tons per month. But in the first month of this year, the shipments amounted to the enormous total of 567,400 tons, compared with 1300 tons in January, 1902, or an increase beyond the normal rate of export of well over 6,500,000 tons per annum.

These figures are worthy of serious consideration, for an obvious reason. If, although the extraordinary situation in the States is draining the coal markets of this country, directly and indirectly, to the extent of between 8 and 9 million tons per annum, those markets do not show signs of exceptional inflation—as Sir George Livesey has pointed out, there has been no difficulty in getting plenty of coal at any time during this winter at a price not far above the current contract rate—what would be the relative positions of coal buyer and coalowner if that drain were to cease? It does not require a very shrewd mind to appreciate what the effect would be if that were to happen. What, therefore, the prospective buyer of coal is anxious to know is: When is the American demand for iron and coal likely to slacken off, or actually to fall to its normal level? We do not pretend to be able to answer that question with any certainty, nor do we think there is anyone on either side of the Atlantic who would be anxious at the present moment to stake his reputation upon the accuracy of a forecast of the position six months hence. But we will go so far as to say that, while there is no immediate prospect of a collapse in the American demand for iron, elements making for a break are not wanting—particularly, increasing production, and high prices—and that the maintenance of the present rate of coal exports to the States for any extended period is most improbable. We will look at the iron situation first.

The output of pig iron during the six half years commencing with the June half year, 1900, was, in millions of tons: 7·64, 6·15, 7·67, 8·20, 8·81, and (December half year, 1902) 9·01. In view of the fuel shortage last half year, the increase shown during that period is remarkable; and considering that at the end of the year the furnaces in blast numbered 307, against 266 and 232, at the end of 1901 and 1900 respectively, the only obstacle in the way of the output catching up the consumption—which last year exceeded 19 million tons—appears to be that of getting the necessary ore and fuel to the furnaces, a difficulty which the railway companies are reported to be making strenuous efforts to overcome. So far as the immediate future is concerned, however, the facts that the stock of iron available in the States at the end of last year did not exceed 50,000 tons, or less than one day's consumption (compared with 70,000 tons a year before, and 442,000 tons at the end of 1900), and that the current price for prompt delivery of pig iron at Pittsburg is about 92s. a ton, as against 47s. 6d. to 58s. 6d. for warrants on the British markets, must not be overlooked, and make it practically certain that iron will be exported westward in considerable quantities for some time yet to come.

But while the evidences are in favour of iron exports continuing heavy for several months, there is not, as we have said, any reason to anticipate that we shall continue to send coal to the States at the rate of 570,000 tons a month for very long. There will be, no doubt, a big total for this month, and shipments will probably continue abnormal until we are well into the summer; but we expect to see a rapid decline in the present rate of export as soon as the second quarter of the year is reached, and, apart from the American demand, the shipments of coal show no material increase. Last month the total exports (including bunkers) reached 5,029,100 tons, as against 4,376,000 tons and 4,236,400 tons in the month of January in the two preceding years; and the American demand accounted for all but 100,000 tons of the increase. It may be of interest to note, in passing, that, for the first time, the Board of Trade returns distinguish

between the different kinds of coal exported, and that gas coals amounted last month to 424,400 tons out of a total of 5,029,100 tons; steam coal accounting for 2,820,100 tons; and bunkers for 1,345,600 tons.

In the face of the situation we have described, and of the fact that the home markets for iron and steel, and trade centres generally, are, and appear likely to remain at present, very quiet, there is only one inference to be drawn; and that is that coal buyers will be very unwise if they enter into any long engagements upon the terms now to be had. Coal is still much too dear; and there is no good reason why, if gas companies generally will only be sufficiently brave and patient, and will but work together for the common good, they should not this year recover a good proportion of the leeway they have still to make up before they will be in as favourable a position as they have enjoyed in former years. There is a lot of difference between 9s. per ton f.o.b. Tyne, and 6s. 6d. or 7s.; and there is no reason why the coalowners should pocket it again this year.

THE REPRODUCTIVE UNDERTAKINGS OF ENGLISH MUNICIPAL CORPORATIONS.

THERE was issued last week a return relating to the reproductive undertakings carried on by Municipal Boroughs, from particulars specially obtained by the Local Government Board from the authorities. The number of Municipal Corporations in England and Wales (excluding London) carrying on one or more undertakings of this description at the close of the last municipal year was 299, out of a total number of 317. The practice in question may therefore be fairly styled general. It is to be noticed that the present is the most comprehensive return yet obtained, as it embraces in addition to water, gas, electric lighting, and tramway undertakings, particulars relating to markets, baths, burial-grounds, working-class dwellings, piers, and quays and harbours. An attempt has also been made to get at the real facts of the financial results of these undertakings; it being explained that information has been required as to the amounts that ought to be credited to the revenue accounts for the value of the products used for municipal purposes, as gas and electricity for the public lighting, water for sanitary purposes, and so forth. Similarly, columns of the tables are appropriated to show the amounts of the annual payments in respect of principal and interest on money borrowed and on account of depreciation. Payments in respect of insurance and rates have also been included among the working expenses. The Town Clerks were requested to furnish, for the purposes of the return, information as to the areas served by the undertakings where such areas are not conterminous with the boroughs; the sources from which capital other than borrowed money had been obtained; the amounts of perpetual annuities and irredeemable stock; and the bases on which payments, if any, were made to depreciation funds.

The capital provided on March 31, 1902, for carrying on the principal classes of municipal reproductive undertakings, omitting those under a year old, amounted to £121,172,372, of which £117,032,923 was borrowed money. Of this indebtedness, £16,246,519 had been paid off; leaving £100,786,404 outstanding. The amount in sinking funds in respect of capital borrowed was £4,644,895. The yearly income on revenue account of the concerns representing this investment, including credits for products used by the municipalities, but excluding deficiencies made good out of the rates, was £13,040,711. The average annual working expenses was £8,228,706; the difference between the two last sums being £4,812,005. Out of this come repayments of principal, £1,264,544; interest, £2,975,906; depreciation allowances, £193,274—giving a total expenditure on revenue account of £12,662,430. The balance, being "net profit," is £378,281.

In this summary, an amount of £116,180, being the average annual amount of the general, legal, and establishment charges of corporations charged to their undertakings, is included in the working expenses. The trustworthiness of the bookkeeping is not called into question; but great pains have been taken to accurately represent the facts as admitted by the corporations. Not very much in the way of municipal reproductive undertakings has escaped the return. The question-begging term municipal "trading" enterprises has been avoided; and the return comprises many undertakings which could hardly be properly described as trades, though they are in their way reproductive. Of such are a crematorium at Kingston-upon-Hull and a racecourse at Doncaster—remarkable illustrations of how municipalities can profit both from the quick and the dead! Enthusiasts for municipal enterprise may also be gratified to learn that "marine lakes" at Southport and concert-rooms at Harrogate are united in exemplifying the "principle." But as regards the scale of importance, water-works stand far above all other municipal trading interest, and are responsible for half the capital investment mentioned. Yet this kind of undertaking is not very profitable directly; returning a net annual balance of only £90,128 upon its outstanding capital of nearly 50 millions.

Gas-works spell profit for municipalities to the tune of £394,825 annually upon a debt of 18½ millions; being far and away the most profitable property in the whole list. No other runs to three figures. Electric lighting shows a loss of £11,707. Tramways owned and worked by corporations show a profit of £81,904; and tramways not worked returned £17,414. Markets come a long way after, with £83,782. But inasmuch as this profit was realized upon an outstanding debt of less than 4 millions, this must be regarded as a very paying kind of property. Baths and washhouses show a heavy loss, of £124,952 a year. And so do harbours, working-class dwellings, and burial-grounds. It appears that corporations can only house, electric light, wash, and bury the people at a heavy loss. The people take water, burn gas, use tramways, and go marketing at an advantage to the corporations that provide them with facilities for doing these things.

It is impossible to go into the details of the return, which occupies many pages of deeply interesting tables. It should be explained here that the term "average annual income and expenditure" used in the summary refers to the figures for the four years ended March 31, 1902. These pages will be a mine of statistical wealth for those who have occasion to inquire how corporations have fared (say) in regard to electricity supply. When one remembers how they all, without exception, expected to realize enormous profits from this enterprise, the collective amount of chagrin which must result from an inspection of the statistics here collected is something considerable. Various other reflections are suggested by these important figures. First and foremost, of course, is the ridiculous amount of so-called net profit which has rewarded all this municipal trading "at a profit." This is probably the point which Sir Henry Fowler, who obtained the return, wished to establish by it. He has been amply justified. Henceforth, when people talk about the advantages to municipalities of trading at a profit, it will be sufficient to refer to this return for proof that the benefit is so small as to be not worth talking about. There may be other advantages, of course; but they are not in question in this connection. Trading, ostensibly for profit, which can only show a clear balance of £378,281 upon a perishable outstanding capital investment of 100¾ millions, is not very remunerative trading, whatever else it may be.

And even this microscopic advantage is not a fact for realization—that is to say, it is not trade profit as a trader would understand the term. Neither the cost of administration nor the burden of depreciation is properly stated. The profitable working is that of a "slate club," where benevolence supplies all the superintendence and clerical service, and the beneficiaries are never allowed to suffer any common trading loss. It will surprise many people to see by these tables how small a share of corporation indebtedness has yet been paid off. Though not the oldest class of property, gas-works stand very high in this regard, having already, on an average, cleared off one-fifth of their borrowed capital. Water-works, though much older, have a far higher proportion of their cost outstanding, which is explainable by the longer duration of the advances. Markets, being mostly old properties, have one-third of their cost wiped out; and burial-grounds are in a still healthier financial condition. Electricity supply, being young, is, of course, a long way behind. We fancy, however, that few will be prepared for the news that over the past four years, all the municipal electricity supply undertakings in England and Wales, out of London, had to own to a loss which was really very serious, having regard to the fact of what was expected of the business. This is the benefit of making the basis of the return as wide as possible. The total amount of profits is really made up of a very few exceptionally favourable returns, mostly from Lancashire boroughs. Bolton, for instance, shows profits of £42,150, against deficits of £4343. Blackpool gains £17,398, and only loses £121. Liverpool is £54,903 to the good, and £9599 to the bad. Manchester shows profits £103,158, against losses of £41,695. Southport occupies the almost singular position of making all their undertakings pay. After the large figures relating to the manufacturing centres, the older and smaller cities and towns make a very ineffective display, usually on the wrong side. Such a place as Leamington cannot be expected to trade with residents at a profit; and, in point of fact, it serves them at a loss.

Indeed, there is any amount of instruction and not a little modest entertainment of a kind to be extracted from this invaluable return, by those who know how to deal properly with the matter. Suffice it to say that both partisans of municipal trading and those who disbelieve in the practice will probably have recourse to these tables to support their preconceived opinions. The magnitude of the commitment of English Corporations to reproductive enterprises is shown clearly enough by these tables; but not less so the little they gain by them. Apart from gas, there is nothing in it; and if the gas were less profitable, it would be cheaper. Water supply is as frequently a burden upon the rates as it is a source of profit. It is largely municipalized, not because it is a necessary of life—for that description would apply equally to other commodities and services which are not municipalized—but because the supply is a question of public health, and the collection of the water often a matter of national concern. The disappointing character of municipal trading in electricity has already been recognized. Municipal tramways are in a transition stage, from which they may emerge on one side of the balance-sheet or on the other. With regard to the remaining municipal concerns, such as the provision of markets, baths, and industrial dwellings, the compulsory nature of the undertakings forbids their being carried on solely or chiefly for the sake of the profit, as a tradesman would carry them on; so that they can never rank as trading enterprises.

THE GRANTON WORKS OF THE EDINBURGH AND LEITH GAS COMMISSIONERS.

DESCRIPTION PREPARED

BY

WALTER RALFH HERRING, M.INST.C.E., *Engineer*.*

ARTICLE VIII., accompanied by two Plates. Plate No. 9 illustrates the 1000 Tons per Day Inclined Retort Carbonizing Plant. Fig. 1 shows a General Elevation of the Drawing and Charging Stages; Fig. 2, a Sectional Plan on Various Levels; Fig. 3, a Transverse Section of the General Arrangement of the Coal Store and of the Coal Unloading and Elevating Apparatus. Plate No. 10 contains General Details of the Retort-Bench.

The carbonizing plant is upon the inclined-retort principle, and consists of four benches, each bench comprising fourteen settings of nine retorts, 20 feet long—two benches in line, set back to back, with the charging stage between.

Plate No. 9 illustrates the general arrangement of the entire plant. Fig. 1 is a half-view of the drawing-stage elevation, with the producer floor beneath, and a half-view of the charging-stage elevation. A plan of the general arrangement is given in fig. 2. Fig. 3 is a transverse section on the centre line of the retort-house, showing (in end elevation) two of the retort-benches and the coal store, together with the coal-unloading arrangements, the belt conveyor feeding the coal-breakers, the elevators, and the traversing conveyors in the retort-house. Fig. 4 is the waggon-tipping arrangements in elevation.

The foundations for the benches, as already explained, consist of a slab of expanded-metal enforced concrete resting upon the transverse supporting walls carried down to the solid. In Plate No. 10, figs. 1, 2, and 3 show the formation of these foundations; the brick encased concrete piers 21 ft. 2 in. long by 2 ft. 9 in. wide, descending to the solid ground. The foundations for the end or buttress walls are broader for the thicker end walls of the bench, as well as being extended to form the chimney bases. Fig. 1 shows the expanded metal in position, prior to placing the bed of concrete thereon; and it more particularly illustrates the pockets which were formed in the concrete for receiving the ends of the front, back, and end buckstays, together with the 4-inch by ¾-inch flat-steel bent straps, embedded in the concrete, to act as ties to the feet of the buckstays.

It will be sufficient to describe in detail one bench, as all four are exactly alike. Plate No. 10, fig. 7, is a transverse sectional elevation of one division wall and arch. Fig. 8 is a front elevation of two arches at one end of the benches. Fig. 2 shows a longitudinal sectional elevation of the main flue, with the gas-outlet ports formed in the bottom of same. Fig. 3 is a transverse sectional elevation above and below the floor-line of the retort-house, showing the cross section of the main flue with a mid-feather in the centre, and the gas-ports leading into the base on either side of the same as well as the drain trench in front of the producers. Fig. 4 is a plan illustrating the lower work of the setting—more particularly the waste-gas channels leading into the main flue. Photographs Nos. 38 and 39 show the main flue with its mid-feather and gas ports.

It was decided to employ dwarf chimneys in connection with the settings, projecting just above the ridge of the roof. Each bench is divided by a division in the main flue into two equal halves of seven settings each, the chimneys being constructed and forming part of the end buttress walls of the bench.

Longitudinally, the main flue is divided by a mid-feather so as to prevent the diverse currents of waste gases impinging one upon the other as they enter the flue from either half of the settings. The outlet ports from the settings into the main flue (fig. 4) are splayed in the direction in which the waste gases must flow to the respective chimneys. Care was also taken that the ports were inserted into the lower part of the side walls of the main flue, so that the waste gases in the main flue (which naturally occupy the crown of same) should not in any way impede the exits from the settings. In fact, in all cases diverse currents of gases were not allowed to meet until they had been directed into the exact current common to all—a precaution which is of greater importance than is sometimes credited.

The clear area of the main flue for each seven settings is 15·87 superficial feet; the area of each chimney serving seven settings is 12·25 superficial feet. The chimneys, as previously mentioned, form part of the end walls of the benches; the foundations of the chimneys being laid directly upon the concrete on a dry, smooth, and level bed, so as to permit of them sliding forward, as a consequence of the expansion of the bench, without wrenching and cracking the same. Clearance was also left in the openings through the roof for the same purpose.

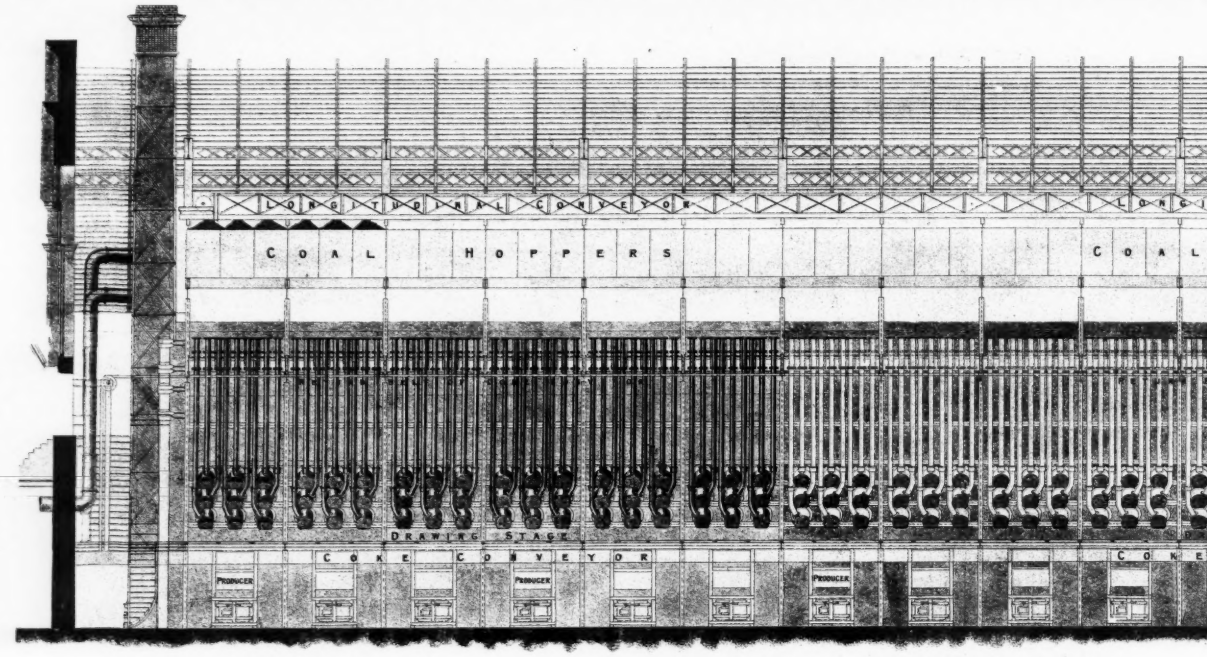
The chimneys are 3 ft. 6 in. square inside, with walls 9 inches thick from the base to the capital. They are braced by means of T steel corner bars, and 3 inch by ½ inch flat diagonal bracing for a height of 52 ft. 6 in. The four chimneys at the outer

PHOTOGRAPH No. 37.—Shows the bottom three courses set in cement mortar of the division walls of the retort-benches below the water line of the ash pans. (March 8, 1901.)

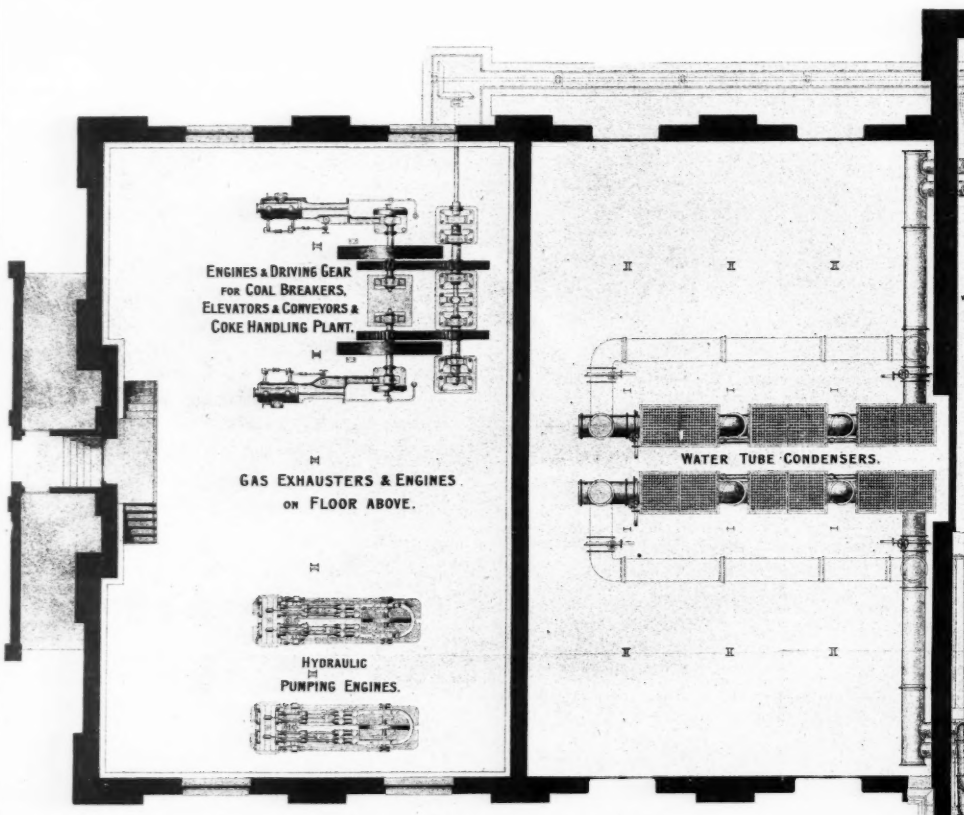
*** The dates on the photographs also illustrate the progress that was made with this work.

* All Rights of Reproduction Reserved.

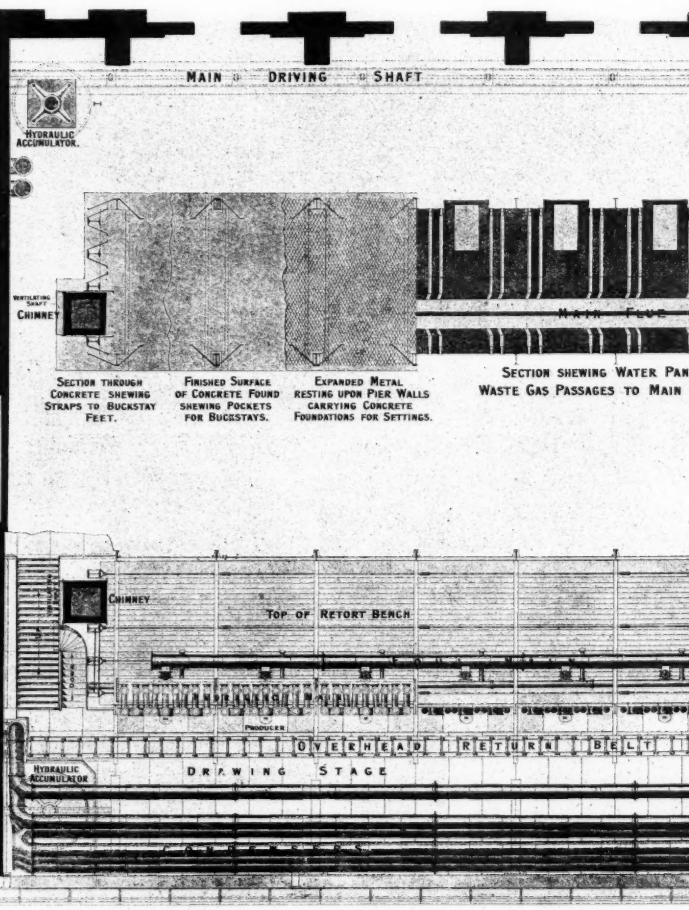
The 1000 Tons per Day Inclined Retort-H

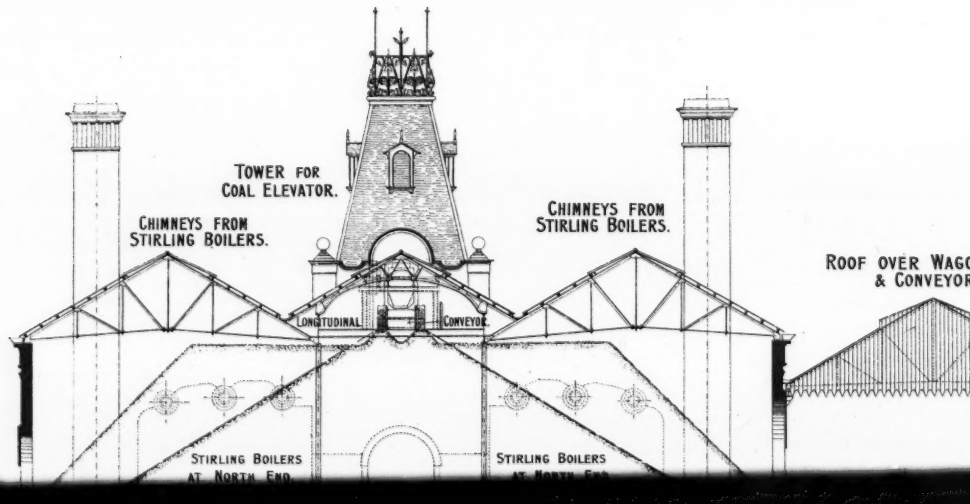


PART ELEVATION OF DRAWING STAGE.


ENGINES & DRIVING GEAR FOR COAL BREAKERS, ELEVATORS & CONVEYORS & COKE HANDLING PLANT.
GAS EXHAUSTERS & ENGINES ON FLOOR ABOVE.
HYDRAULIC PUMPING ENGINES.
WATER TUBE CONDENSERS.

GROUND FLOOR PLAN.


MAIN DRIVING SHAFT
HYDRAULIC ACCUMULATOR.
CHIMNEY
Section through Concrete shewing Straps to Buckstay Feet.
Finished Surface of Concrete Found shewing Pockets for Bucestays.
Expanded Metal resting upon Pier Walls carrying Concrete Foundations for Settings.
Section shewing Water Pan
Waste Gas Passages to Main
CHIMNEY
TOP OF RETORT BENCH
PRODUCER
OVERHEAD RETURN BELT
HYDRAULIC ACCUMULATOR
DRAWING STAGE



House at the Granton Works of the Edinburgh and Leith Gas Commis

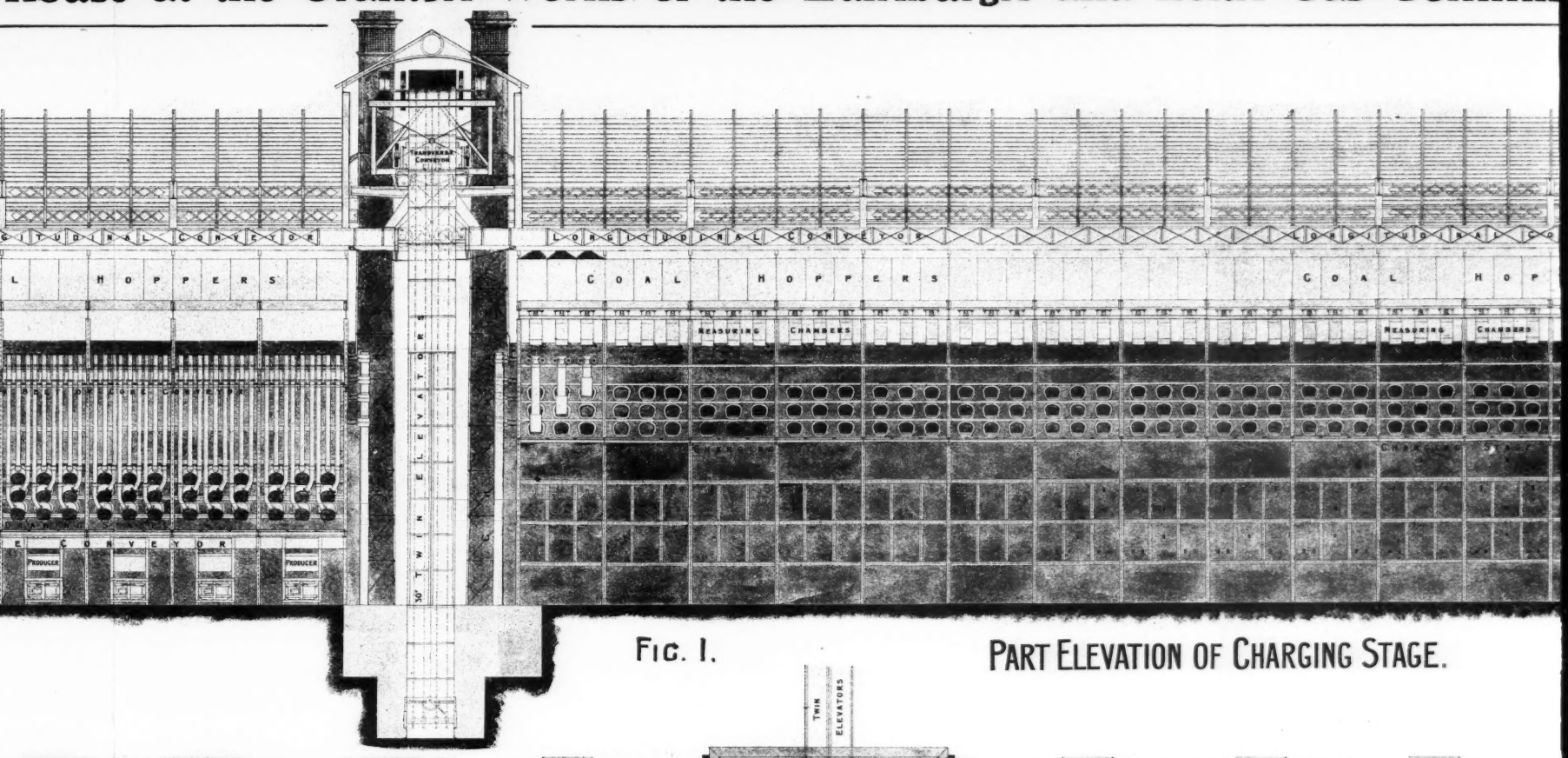


FIG. 1.

PART ELEVATION OF CHARGING STAGE.

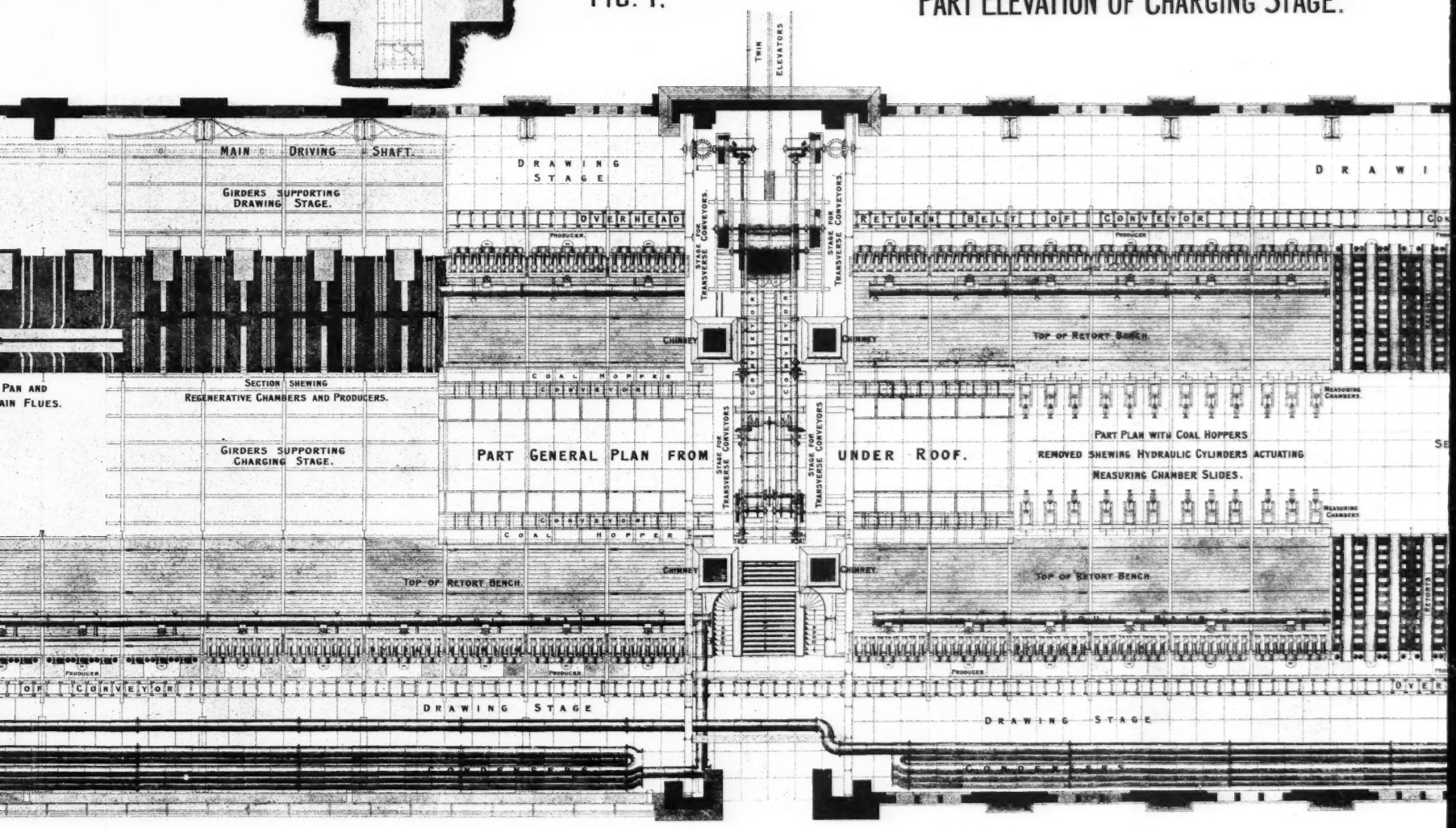
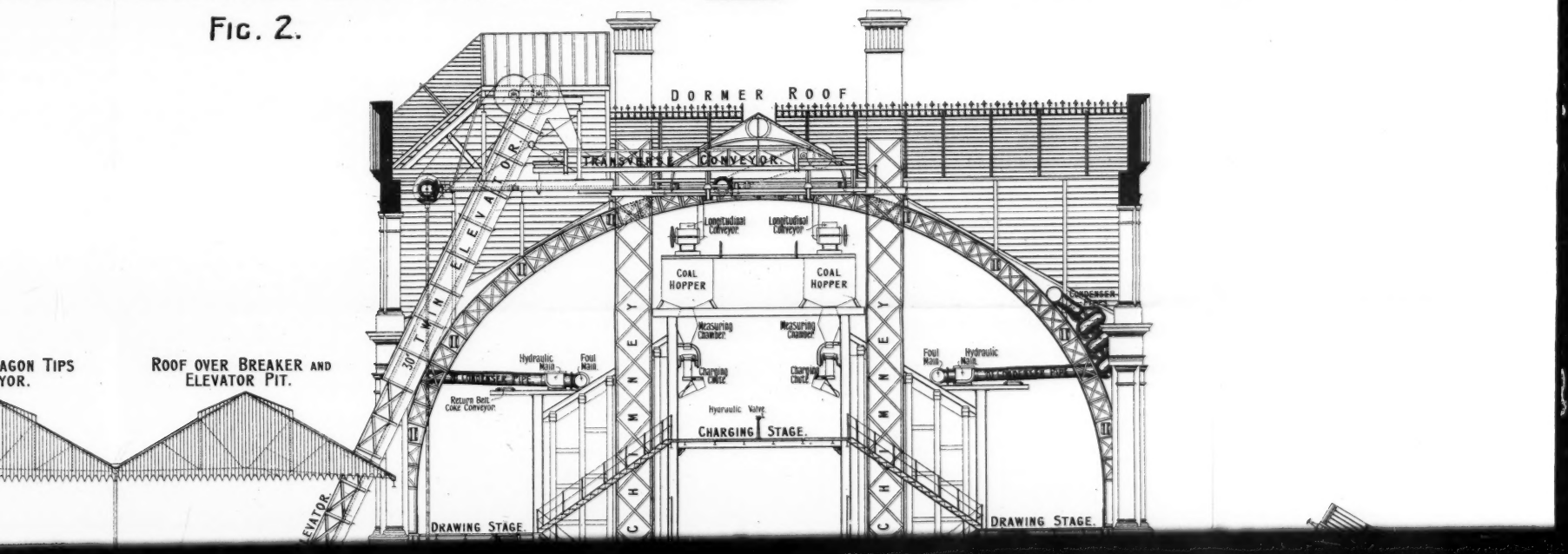


FIG. 2.



e at the Granton Works of the Edinburgh and Leith

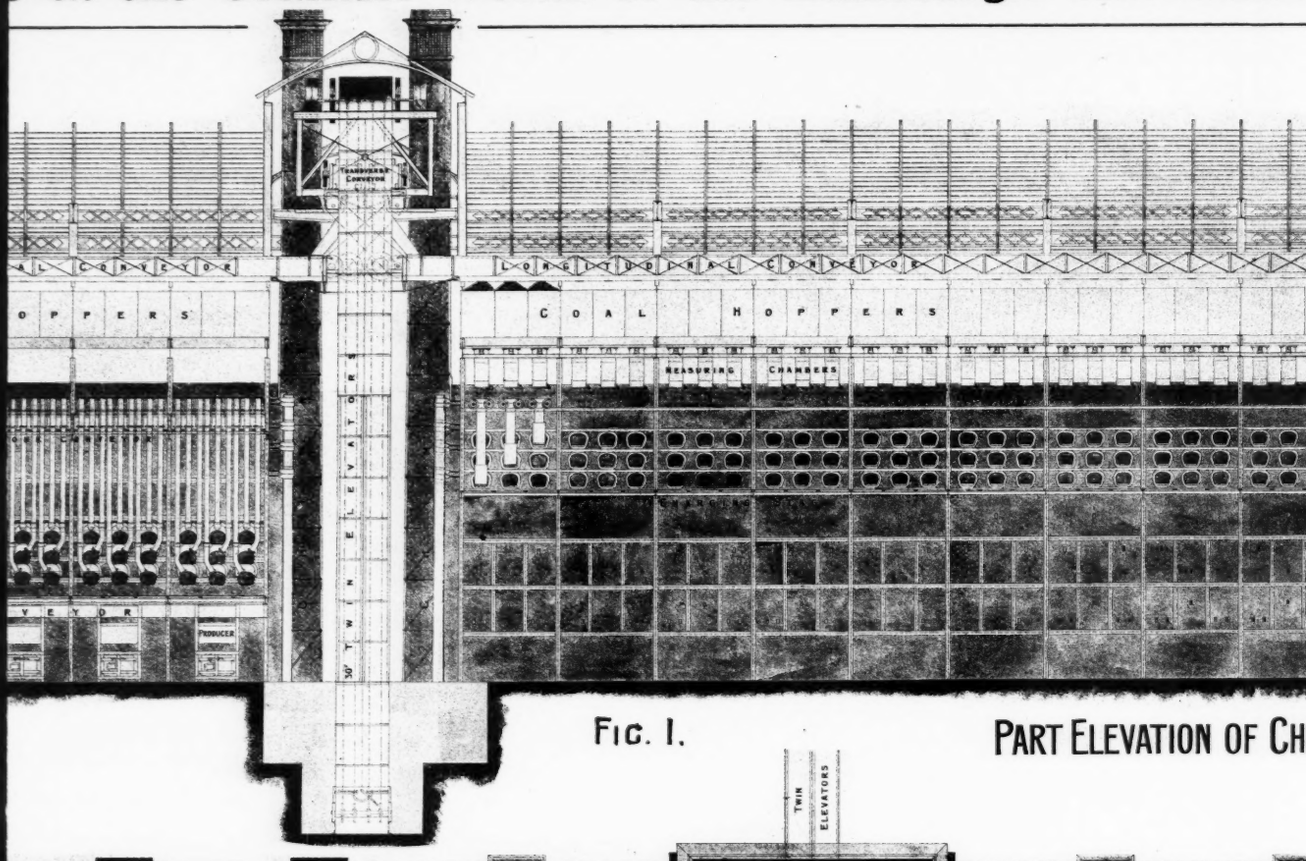


FIG. 1. PART ELEVATION OF CH

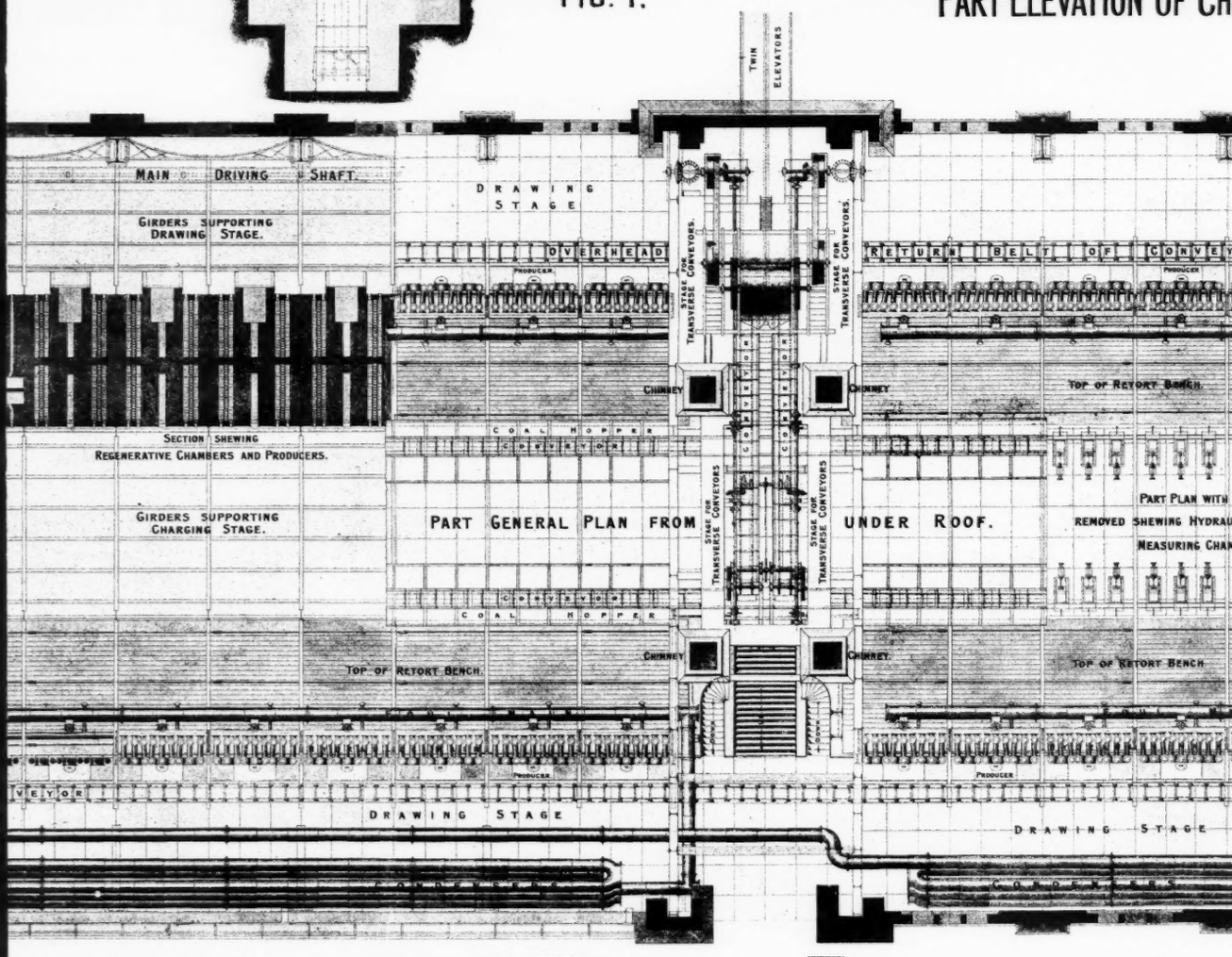
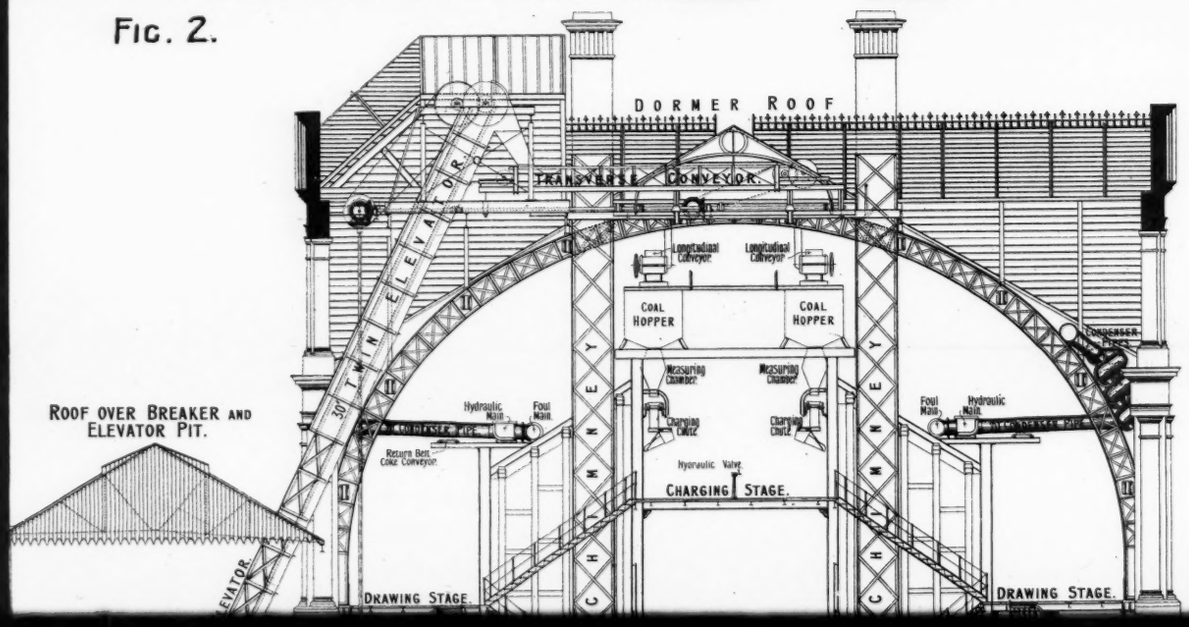
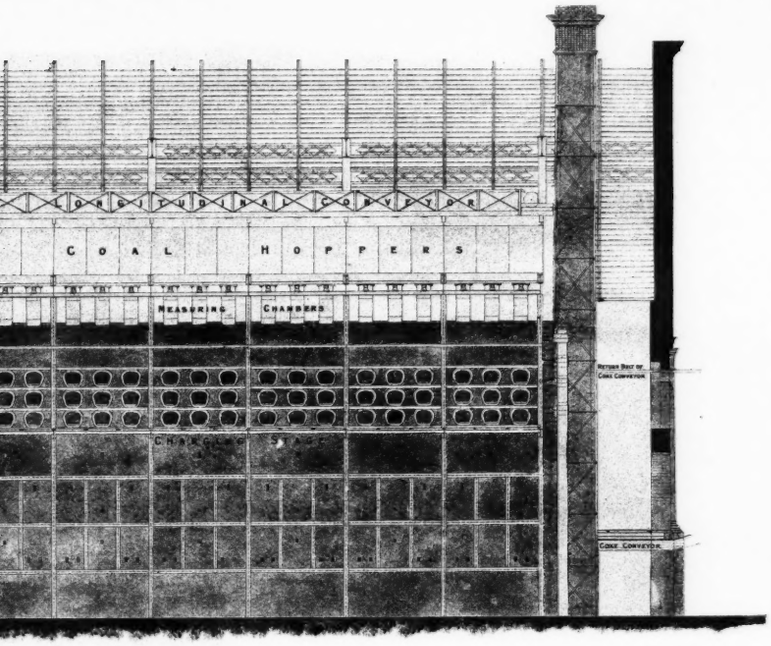


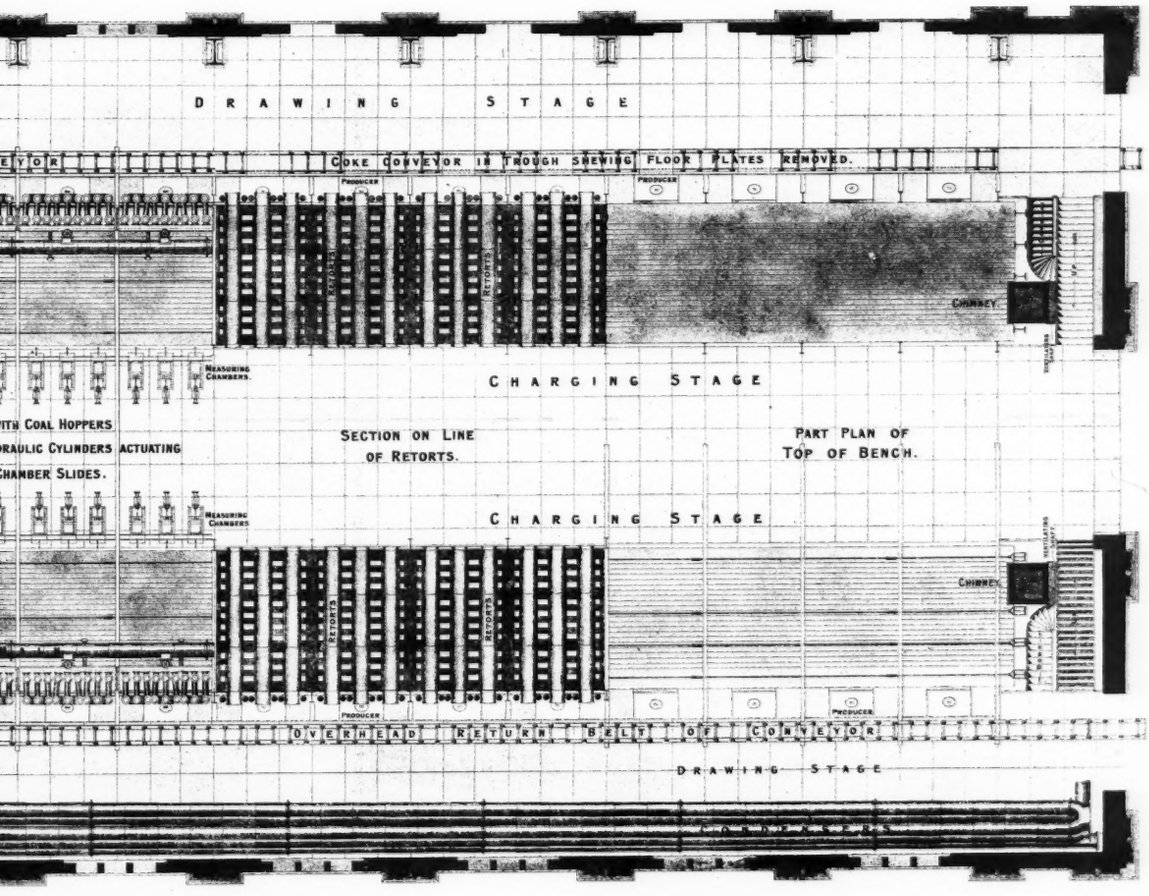
FIG. 2.

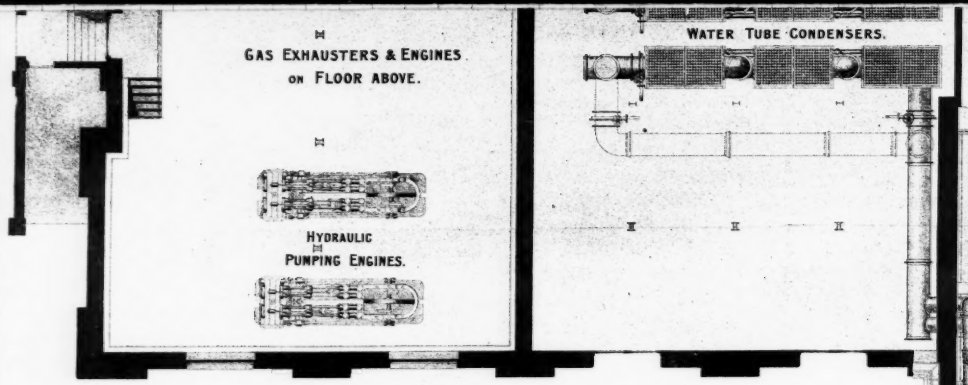


No. 9.

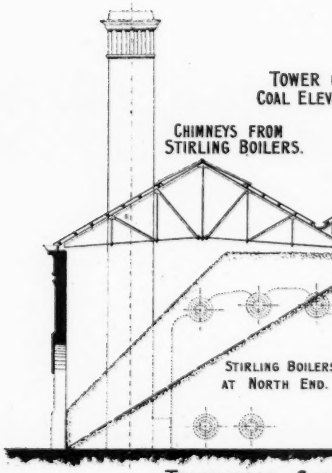


CHARGING STAGE.





GROUND FLOOR PLAN.



TRANSVERSE SEC

NATURAL ANGLE
TRIMMED AS FO

Copyright at Stationers' Hall.

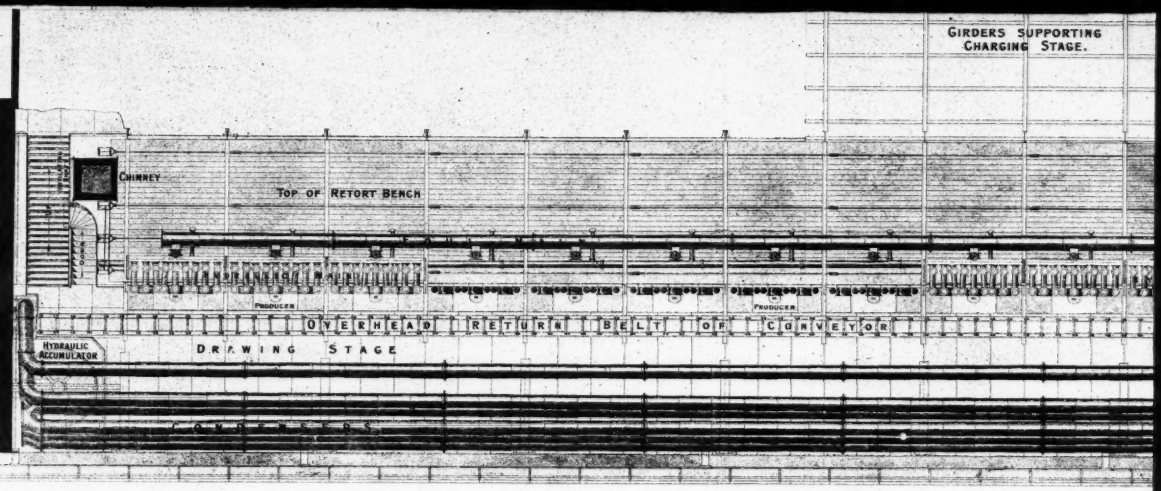
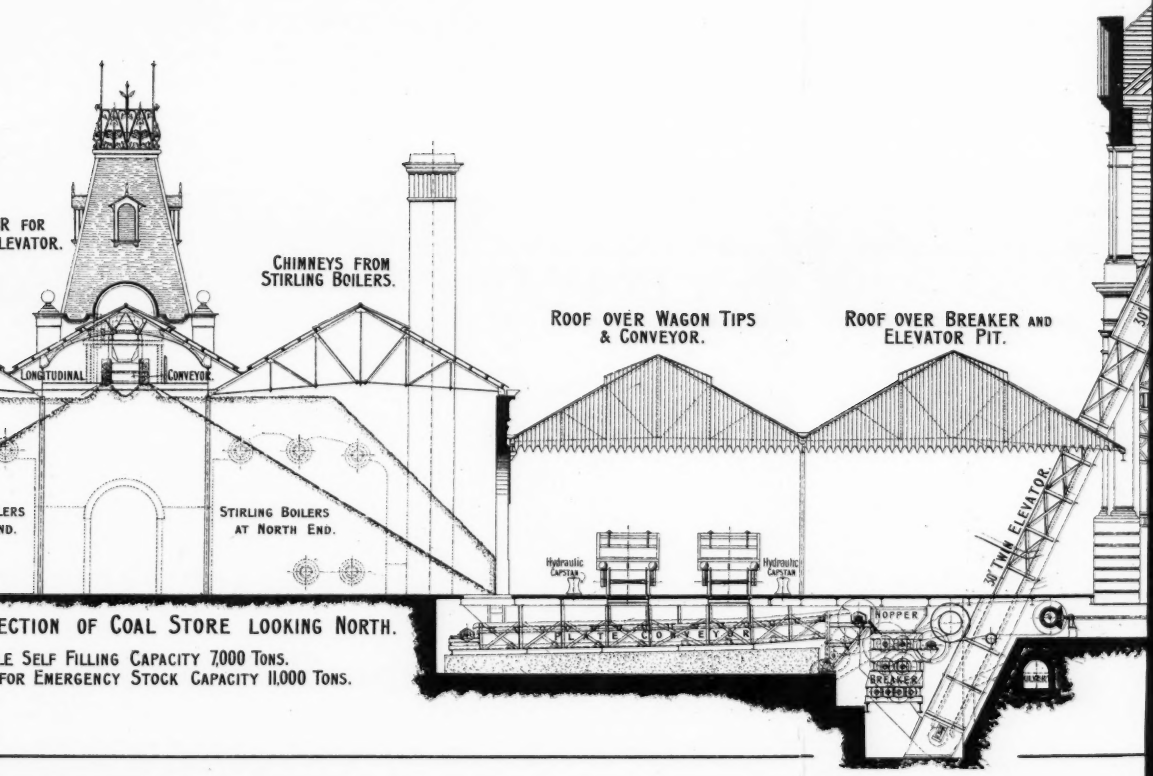


FIG. 2.



ECTION OF COAL STORE LOOKING NORTH.

LE SELF FILLING CAPACITY 7,000 TONS.
FOR EMERGENCY STOCK CAPACITY 11,000 TONS.

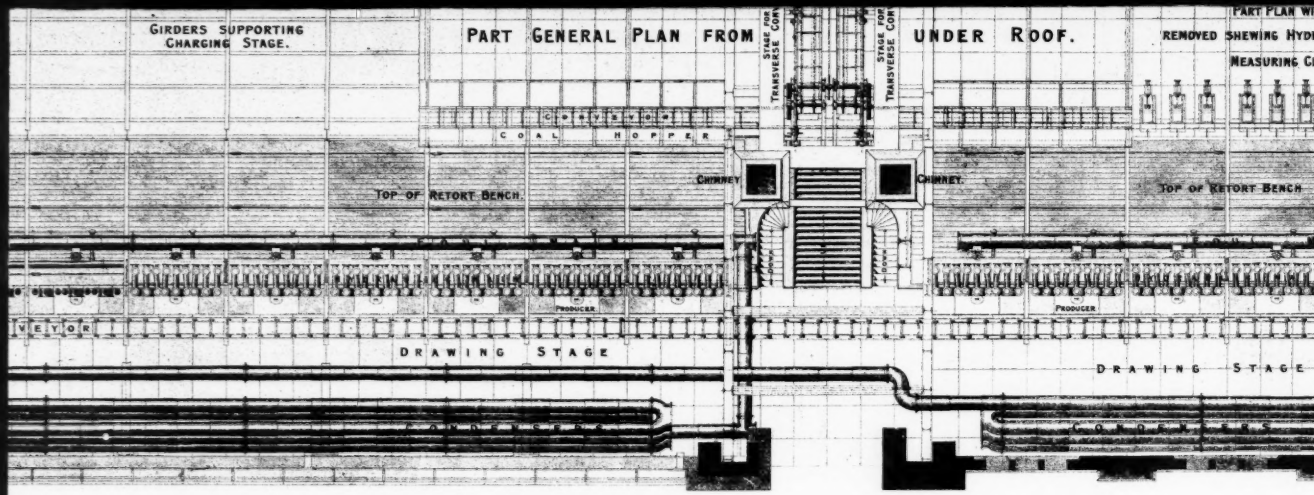

GIRDERS SUPPORTING CHARGING STAGE.
PART GENERAL PLAN FROM
UNDER ROOF.
REMOVED SHEWING HYDR
MEASURING C
STAGE FOR TRANSVERSE CONV
STAGE FOR TRANSVERSE CONV
COAL HOPPER
CHIMNEY
CHIMNEY
TOP OF RETORT BENCH.
TOP OF RETORT BENCH
PRODUCER
PRODUCER
DRAWING STAGE
DRAWING STAGE
CONDENSERS

FIG. 2.

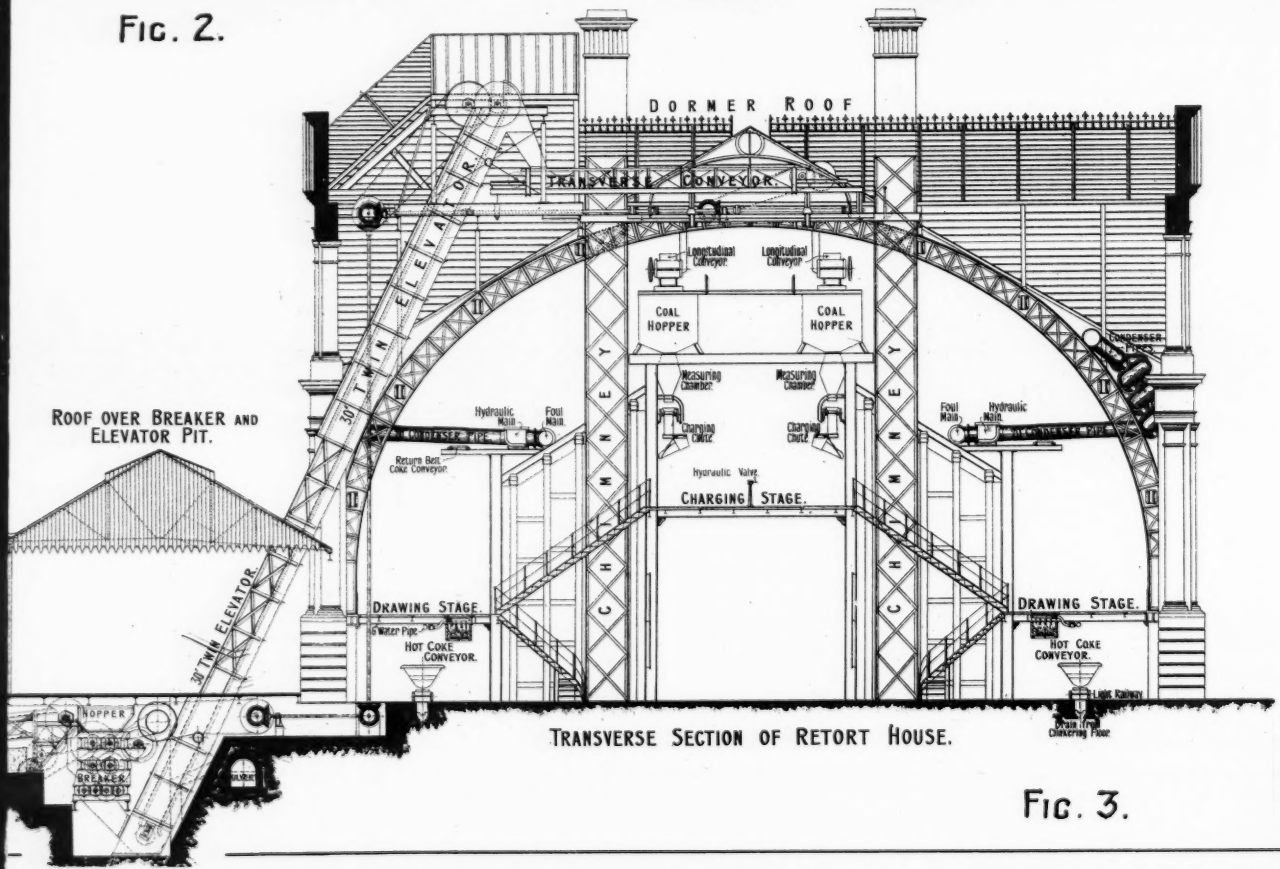
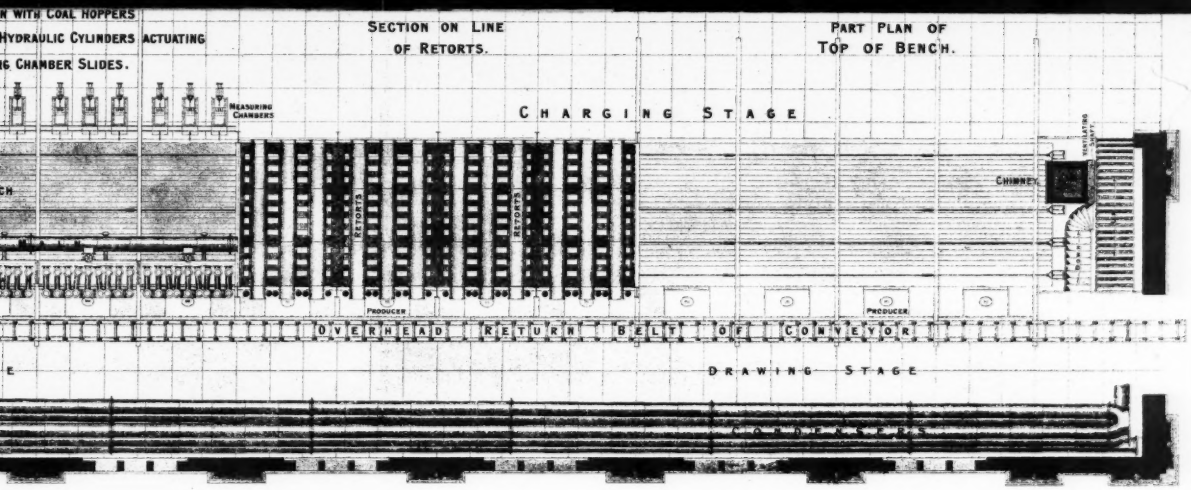
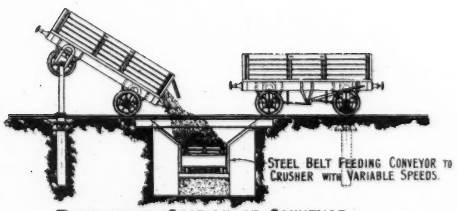

DORMER ROOF
TRANSVERSE CONVEYOR.
30" TWIN ELEVATOR.
Longitudinal Conveyor.
Longitudinal Conveyor.
COAL HOPPER
COAL HOPPER
CONDENSER PIPE
Measuring Chamber.
Measuring Chamber.
Hydraulic Main.
Foul Main.
Foul Main.
Hydraulic Main.
Charging Cintz.
Charging Cintz.
CONDENSER PIPE
Return Belt Coke Conveyor.
Hydraulic Valve.
CHARGING STAGE.
CHIMNEY
CHIMNEY
ROOF OVER BREAKER AND ELEVATOR PIT.
30" TWIN ELEVATOR.
DRAWING STAGE.
DRAWING STAGE.
6" Water Pipe.
HOT COKE CONVEYOR.
HOT COKE CONVEYOR.
HOPPER
BREAKER
VALVE
LIME RAILWAY
Main Inn Charging Floor
TRANSVERSE SECTION OF RETORT HOUSE.

FIG. 3.





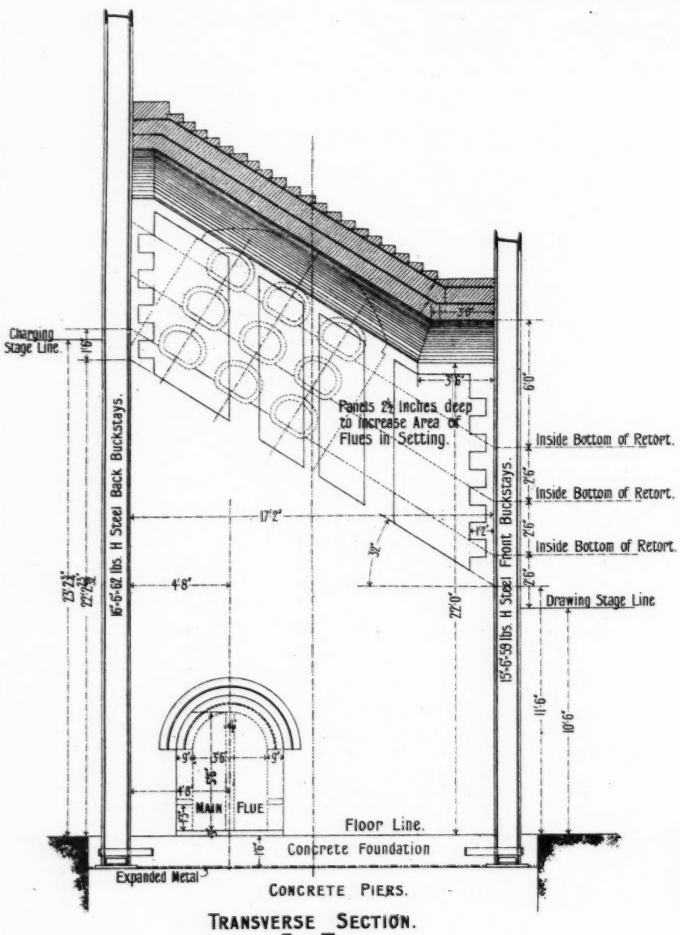
TRANSVERSE SECTION OF CONVEYOR AND WAGON TIPPING APPARATUS.

FIG. 4.

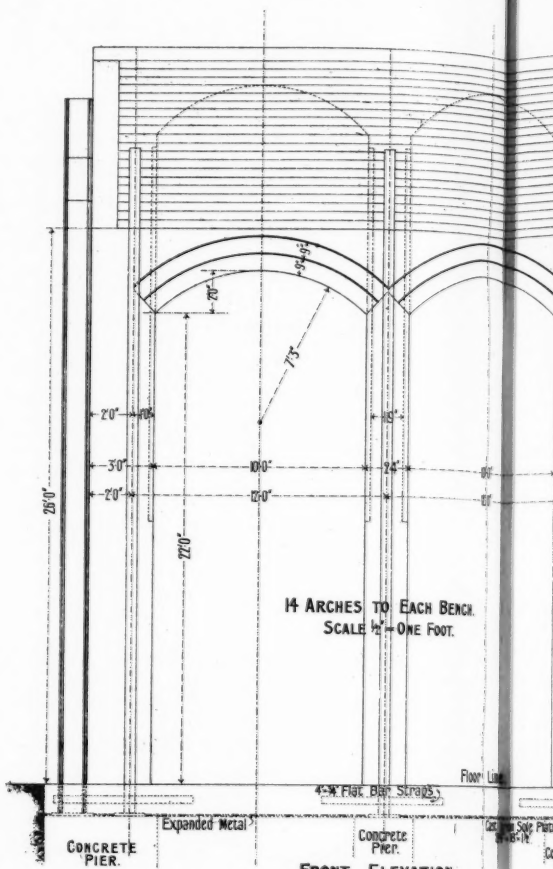
WALTER RALPH HERRING,
M.INST.C.E., *ENGINEER.*

The Granton Works of the Edinburg

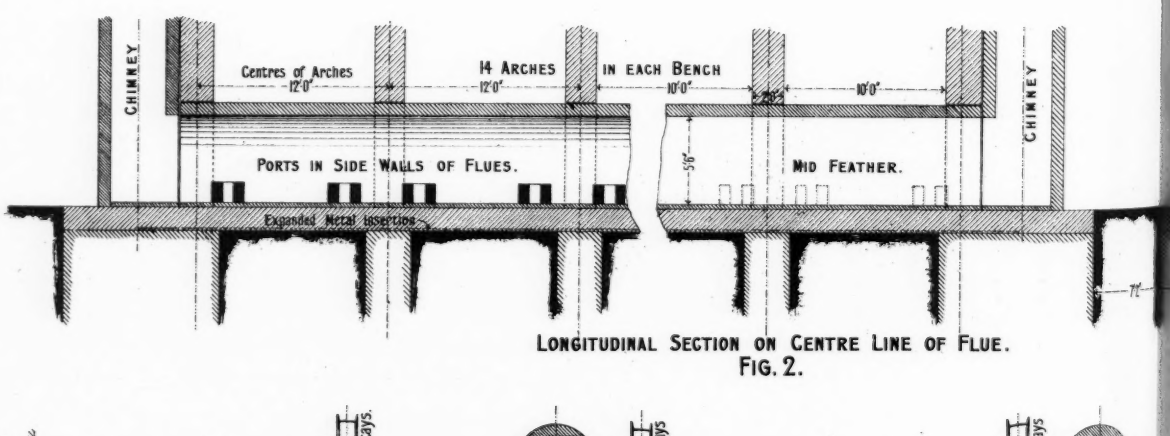
The 1000 Tons per Day Inclined Retort Carbonizing Pl



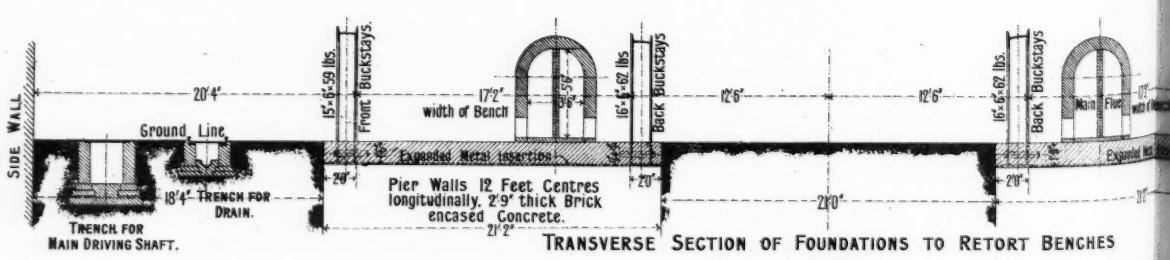
TRANSVERSE SECTION.
FIG. 7.



FRONT ELEVATION.
FIG. 8.



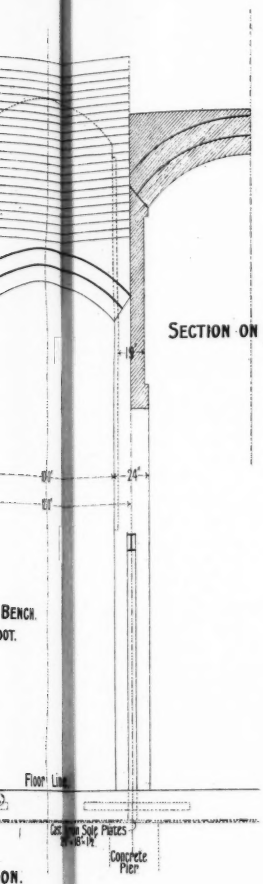
LONGITUDINAL SECTION ON CENTRE LINE OF FLUE.
FIG. 2.



TRANSVERSE SECTION OF FOUNDATIONS TO RETORT BENCHES LOOKING NORTH.
FIG. 3.

Copyright at Stationers' Hall.

onizing Plant.—**Details of Retort Benches, Main Flues, &c.** No. 10.



SECTION ON LINE AB.

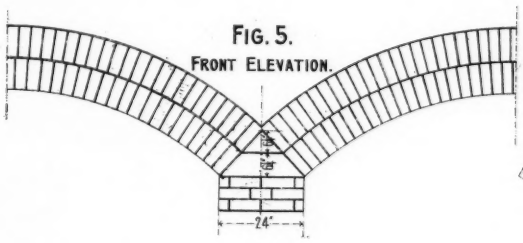
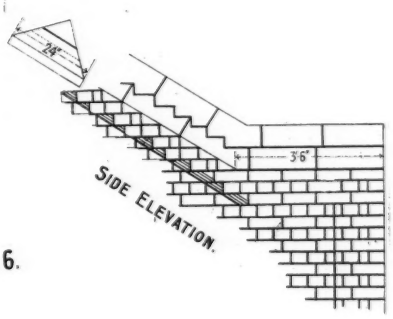
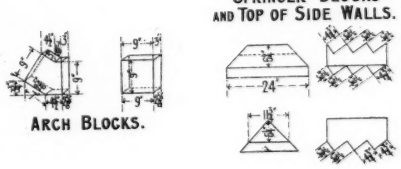


FIG. 5.
FRONT ELEVATION.





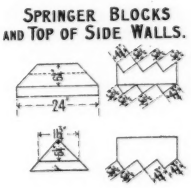
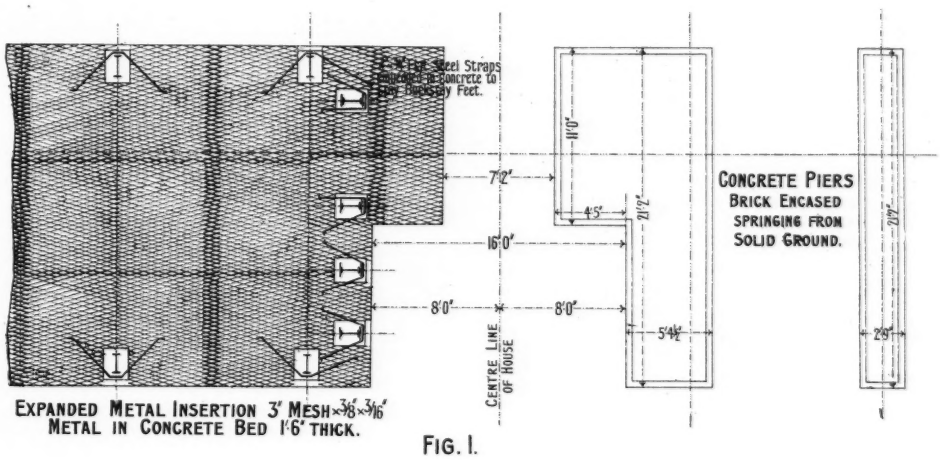
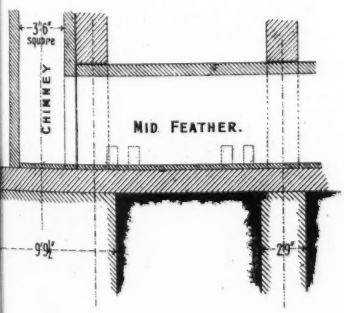


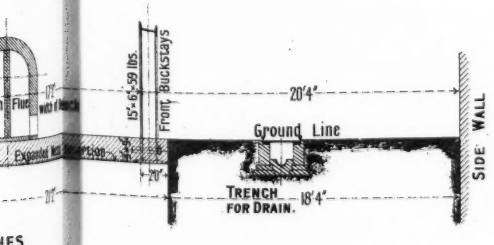
FIG. 6.

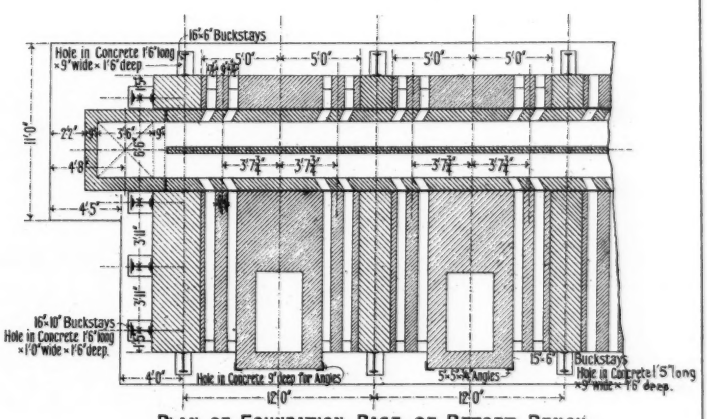


EXPANDED METAL INSERTION 3" MESH × 3/8" × 3/16" METAL IN CONCRETE BED 1'6" THICK.

FIG. 1.







PLAN OF FOUNDATION BASE OF RETORT BENCH.

FIG. 4.

WALTER RALPH HERRING,

M.INST.C.E., *ENGINEER.*

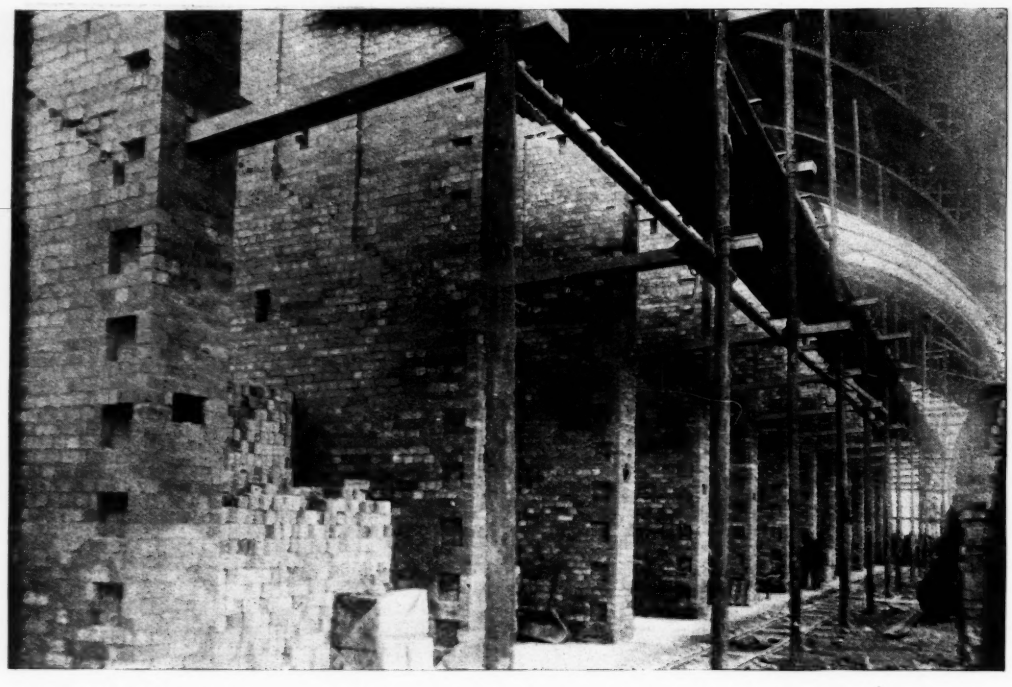
PHOTOGRAPH No. 38.—Illustrates the main flue of the retort-bench with the mid-feather partition in same. (March 21, 1901.)

ends of the building are 71 feet high. The four chimneys at the centre of the building are 82 feet high—these being raised in order to clear the dormer roof of the retort-house.

The furnace-floor level is drained from end to end on each side by means of a drain trench (fig. 3) immediately beneath the floor, consisting of a fireclay half pipe set in a concrete bed, and having an inclination from one end of the retort-house to the other of 1 in 20—exhibited on Photograph No. 42. At the north end of the retort-house, these drains are made to discharge into a settling pit 15 ft. long by 9 ft. wide by 7 ft. 6 in. deep; and by means of a weir and sealed bar, the water flows freely into the main drain—leaving behind the silt and breeze. The contents of the settling pit are periodically removed to the breeze stack. The drain trenches are 1 ft. 6 in. wide from end to end, with 9-inch brick walls resting upon the concrete bed, into which the half-pipes are embedded.

Along the tops of the walls forming the sides of the trench, a light bulb rail is laid for a 2-foot gauge light railway, upon which tipping waggons are placed for the removal of the ashes and clinker from the producers. The principal portion of this track is covered (as part of the floor) with concrete, excepting that in every 24 feet a cast-iron grating, 4 ft. 6 in. long by the breadth between the rails, is placed—one opposite every alternate buck-stay—in such a position that the two cubic yard tipping-waggons used for the removal of ashes are in convenient positions for being loaded, while the water draining from them falls through the gratings into the drain trench below. These gratings also serve the purpose of moveable covers for giving easy access to, and facilities for, cleaning out the silt. They are also used as a base upon which the red-hot clinker and fire-bars are laid when drawn from the producers so as to avoid injuring the concrete floor.

PHOTOGRAPH No. 39.—Shows the side elevation of the main flue of the retort-bench with the gas-ports entering the bottom of same. The pockets for keying the front and back walls of the settings to the division walls are also seen on either side. (March 21, 1901.)



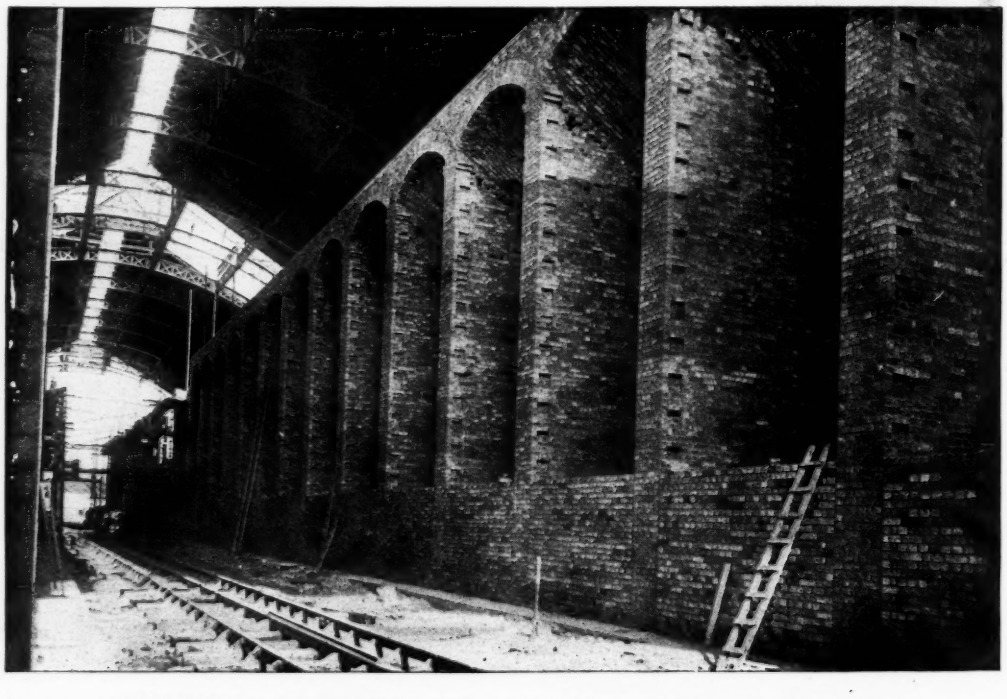
PHOTOGRAPH No. 40.—Illustrates the division walls of the retort-settings with the panels and pockets for keying the front walls. (April 4, 1901.)

Retort Bench.

The details of the retort-benches, division walls, and arches are shown upon Plate No. 10. The division walls between the settings (figs. 7 and 8) are 24 inches thick and spaced 12 feet centre to centre. The end walls are 3 ft. thick. From the floor line to a point 11 ft. 6 in. upwards on the drawing side, rising at an angle of 32° to a point 22 ft. 2¾ in. on the charging side, the division walls are of the full thickness of 24 inches. Above this point to a line immediately beneath the springing of the arch, the division walls are panelled; the panels being 2½ inches deep excepting where the principal transverse division walls of the setting butt against the division walls of the bench. The object of this panelling is to afford the fullest area possible in the flue chambers within the settings, while (to secure the advantage of a 24-inch division wall) the breadth of the settings where the flue channels are formed is 10 ft. 5 in. in the clear.

At both the drawing and charging ends, the full thickness of the 24-inch division wall is maintained; the panel being dog-toothed so as to afford a perfect key between the division walls and the front and back walls of the settings. The same system was also adopted for the full height of the division walls below the retort-settings. The absence of panelling resulted in the key being formed by pockets recessed in the work, as will be seen from Photographs Nos. 40 and 41.

The inclined arch is cast in the manner shown on figs. 5, 6, and 7 of Plate No. 10. The front portion for a distance of 3 ft. 6 in. inwards at the springing line, and 3 feet at the crown, is laid upon the horizontal line, from which point the inclined arch is made to commence. The writer has found this form of arch to be excellently adapted for withstanding the downward thrust. Benches that were built on this principle ten years ago remain as sound and firm to-day as when they were put up; the bonding at the change of angle being easily secured with a little care on the part of the bricklayers.



PHOTOGRAPH No. 41.—Illustrates the complete retort-bench on the charging side. (May 16, 1901.)

PHOTOGRAPH No. 42.—Drain trench with light railway, showing the position of the draining gratings over which ash waggons stand. The spaces between the gratings are covered with concrete. (Jan. 9, 1902.)

The arch consists of two 9-inch rings of brickwork, of specially moulded 9-inch square bricks, to suit a radius of 7 ft. 3 in.; the arch in the breadth of 10 feet having a rise of 2 feet.

The formation of the skewback on the tops of the division walls is a matter of considerable importance, as it affects the stability of the arch. The bricks of the division walls are laid upon the horizontal line and racked at an angle of 32° at the proper height of the wall. This is accomplished in (approximately) half-brick steps. To fill this in with splay bricks, and then to form the ordinary skewbacks by means of splays and squares has been a common practice. This, however, forms a base for the arch, consisting of many little pieces of bricks stuck together with material of non-setting or non-adhesive properties. Realizing this when first called upon to construct an inclined arch for gas-retorts, the writer had a specially formed block—Plate No. 10, fig. 6—moulded in the form of a double skewback with the base serrated to fit into the stepping on the upper part of the division walls. By this means, the skewback is a solid mass, and is resting on a horizontal base; its upper surface alone being upon the angle. To ensure a perfectly fitting block of good form, it is better to supply the brickmakers with a full-sized model (in wood) of what is required. In fact, this is a rule that should always be followed with regard to specially shaped bricks, as it ensures one getting exactly what is required. In the Edinburgh settings, with a 24-inch division wall, it was more convenient to have two courses of blocks.

The arches are built of bricks, 9 inches square, specially moulded to the radius of 7 ft. 3 in.; the total thickness of the arch being 18 inches in all. At the centre, there is only one course of bricks covering the sloping arch; the spandrils being filled in with brickwork laid on the level, and stepped-back in half-brick steps. A greater thickness of work above the arches was not deemed necessary, as the settings beneath are tiled down—thus forming a non-conducting chamber between the upper part of the setting and the underside of the arch. This not only protects the arch from the direct heat of the setting, but it also preserves an equable area for the heat waves to travel in the setting and around the retort.

COST OF STREET LIGHTING BY ELECTRICITY AND GAS.

A Remarkable Testimony for Incandescent Gas Lighting.

Gas and lighting engineers and local authorities generally are placed under an obligation to Mr. J. W. Bradley, the City Engineer of Westminster, for the mass of information he has compiled on the subject of the lighting of the extensive district under his charge, which district constitutes the pick of the West-end of London, in the matter of noble thoroughfares, open spaces, large shops, and palatial residences. The City of Westminster is composed, under the rearrangement of the Metropolis into boroughs, of a number of parishes which were formerly under the administration of Vestries. One distinguished effect of this parochial form of government is the heterogeneity of the public lighting, which shows the dissimilarity of idea, appreciation and intelligence in the matter of these various bodies. This is brought into striking prominence on the work of the management of a number of such parishes being concentrated in a common centre, such as the new Council of the City of Westminster, and the public lighting department entrusted to a man who takes such personal interest in it as Mr. Bradley. He has made a perfect study, as far as is possible, of the many systems of lighting that have fallen under his care; and, while we may not be able to agree with all his conclusions, nor accept as positive in point of accuracy all the data on which he bases those conclusions, yet the good and voluminous work which he has achieved gives us much that is definite on the subject—the remainder is the best that can be accomplished under the circumstances and by the means at command. This being our view, we have given to his reports on the subject the consideration and publicity which they deserve; and from them a great deal of useful matter can be extracted by all concerned in the lighting of our towns and cities beyond the points to which we have directed particular attention.

In the "Journal" for Nov. 18 last year, we dealt with Mr. Bradley's tabularized report on the photometrical tests that had been made by his department of the various types of street-lamps within the city bounds—comprising electric lamps, high-pressure, self-intensifying, ordinary incandescent, and flat-flame gas-lamps, and the Kitson high-power incandescent oil-lamp. Last week we also published the principal parts of a report from him dealing generally with the lighting of the several parishes within the jurisdiction of the Westminster authority; and now this week some further reports which accompanied the last-named one demand consideration. These reports, which largely consist of tabulated matter, were reserved for separate attention as in a measure they are supplemental to, and have some dependence on, the photometrical test report which was dealt with in November last. That report brought into striking relief the great variability of the illuminating-power results obtained from similar lights even under comparable conditions as to time and situation; and this great variation vitiated their value in our eyes, and made us regard them generally with strong suspicion. We should have been greatly obliged to Mr. Bradley if he had taken the hint in the November article, and conceded some information as to the methods and apparatus that he adopted in making the tests. We then strongly suspected, and a re-survey of his figures convinces us, that what we then imagined is right, that the tests were all made by the unfaithful portable photometer. Mistrusted before, the figures only intensify the mistrust. But at the same time, it would still be highly interesting to those

Tests of Street-Lamps (Gas and Electric) with Statement of Comparative Costs.

REPORT No. 1.

Description and Position of Lamps.	No. of Lamps Tested.	Average Candle Power.	Capital Cost of Lamp.	Interest and Sinking Fund per Lamp per annum.	Cost of Illuminant per Lamp per annum.	Cost of Lighting and Maintenance per Lamp per annum.	Total Cost per Lamp per annum.	Total Cost per Candle Power per annum.	Hours of Burning per annum.	Total Cost per Candle Power hour.
			£				£ s. d.	d.		d.
(1) Electric arcs, Whitehall (Charing Cross and Strand Electric Light Company)	10*	512	40	On the 30 years' period (say) £2	£28		30 0 0	*14·1*	3940	0·00358
(2) Electric arcs, St. James's Street and Piccadilly (St. James' and Pall Mall Electric Supply Company)	13	688	45	On the 14 years' period of the Contract (say) £4	£30		34 0 0	*11·9*	3879	0·00307
(3) Electric arcs, Grosvenor Place (Westminster Electric Supply Corporation)	6	675	—		£22		22 0 0	*7·8*	3940	0·00198
					£ s. d.	£ s. d.				
(4) Refuge lamps, incandescent mantles, Victoria Street, four burners in each lamp	7†	153	15	On a 30 years' life (say) 15s.	8 15 6	3 16 0	13 6 6	*20·9*	3940	0·0053
(5) Sugg's high-pressure burners in Whitehall, incandescent mantles	6	459	15	,, 15s.	13 6 2	4 3 10	18 5 0	*9·5*	3940	0·00241
(6) Ordinary single-burner, incandescent mantles, on footways, Victoria Street and Kensington Road	10‡	55	6	,, 6s.	2 0 0	1 4 0	3 10 0	*15·3*	3940	0·00389
(7) Ordinary flat-flame burners, footway in Whitehall, three burners	3§	62	8	,, 8s.	£5 19 2		6 7 2	*24·6*	3940	0·00625

* Several lamps required fresh carbons and globes attending to. † Mantles in bad condition. ‡ Some of these mantles were in bad condition, giving very little light. § Burns 18·48 cubic feet up to midnight, and 5 cubic feet after. The candle power was taken before midnight.

REPORT No. 2.

Description and Position of Lamps.	Number of Lamps Tested.	Average Candle Power.	Capital Cost of Lamp.	Interest and Sinking Fund per Lamp per annum.	Cost of Illuminant per Lamp per annum.	Cost of Lighting and Maintenance per Lamp per annum.	Total Cost per Lamp per annum.	Total Cost per Candle Power per annum.	Hours of Burning per annum.	Total Cost per Candle Power Hour.
			£				£ s. d.	d.		d.
(1) Electric arcs, Whitehall Place and Northumberland Avenue (Charing Cross and Strand Electric Light Company)	6	937	40	On the 30 years' period (say) £2	£28		30 0 0	*7·7*	3940	0·00195
2) Electric arcs, Pall Mall (St. James' and Pall Mall Electric Supply Company)	6	598	45	On the 14 years' period of the Contract (say) £4	£30		34 0 0	*13·6*	3879	0·0035
(3) Electric arcs, Grosvenor Place (Westminster Electric Supply Corporation)	5	691	—		£22		22 0 0	*7·65*	3940	0·00194
(4) No Test.	—	—	—	—	—	—	—	—	—	—
					£ s. d.	£ s. d.				
(5) Sugg's high-pressure burners in Whitehall, incandescent mantles	5	552	15	On a 30 years' life (say) 15s.	13 6 2	4 3 10	18 5 0	*7·95*	3940	0·00202
(6) Ordinary single-burner, incandescent mantle, on footways, Victoria Street	6	62	6	,, 6s.	2 0 0	1 4 0	3 10 0	*13·5*	3940	0·00343
(7) Ordinary flat-flame burners, footway in Whitehall, three burners, each 6·16 feet per hour	6	61*	8	,, 8s.	£5 0 2		5 18 2	*24·6*	3940	0·00625
(8) Ordinary single-burner, incandescent mantle, Carlton House Terrace	5	37	6	,, 6s.	1 10 11	1 1 0	2 17 11	*18·8*	3940	0·00477
(9) Ordinary flat-flame burners, footway Chandos Street, Strand, 5 feet per hour	6	55	8	,, 8s.	£9 0 10		9 8 10	*41·1*	3940	0·01043

* Only gives this candle power up to midnight. Burn 5 cubic feet after midnight.

concerned in public lighting to have from Mr. Bradley a description of the methods he employed in making his observations, in order that they might judge, from personal knowledge and experience, of their completeness in all detail to ensure accuracy. If Mr. Bradley will do this, he will increase the indebtedness of "JOURNAL" readers. He himself shows a little doubt as to the trustworthiness of the photometric tests by the appending of this footnote to the figures in the report now under review: "These results are not given as absolute standard and unvarying results, but only as average results from this particular series of tests." In the first report, too, there appeared the note: "These results are not given as absolute standard values, but only as information resulting from the conditions which obtained at the time of testing." We repeat that a knowledge of what those conditions were, and particulars as to the methods of testing, would be very valuable to the gas profession, in enabling them to judge of the virtue of the figures.

This wide inconstancy of the illuminating results of the lights depraves, in our opinion, many of the figures in the reports now under notice, which give comparative figures of cost of the various systems. For example, let us take report No. 1; there we get an average candle power for the Whitehall electric arcs of 512. But in report No. 2 we find an average candle power given of 937 candles—a difference of 425 candles! Take again the Sugg high-pressure gas-burners in another part of Whitehall. In the first report we get an average candle power of 459 candles; in the second report, 552 candles—a difference of 93 candles! Now how, calculating on such bases as these, can one place any reliance in the figures appearing under the headings of "Total Cost per Candle Power per Annum" and "Total Cost per Candle-Power-Hour"? Founded on such divergent data, we do not think Mr. Bradley can complain of this depreciatory criticism of the calculated costs. Again, one gets this peculiar result by transposing some of the figures in the tables. Take the Whitehall electric arcs in Table No. 1. The average illuminating power is 512 candles; the cost per lamp per annum, £30; the total cost per candle-power per annum, 14·1d.; the total cost per candle-power-hour, 0·00358d. Now these figures are altogether out of the running with the Sugg high-pressure lamps in table No. 2. There we have an average candle-power of 552, a total cost per lamp per annum of £18 5s., a total cost per candle-power per annum of 7·95d., and a total cost per candle-power-hour of 0·00202d. But now take the corresponding figures from the tables—the electric arcs from table No. 2 and the Sugg high-pressure gas-burners from table No. 1; and comparing the cost per candle-power per annum, or the cost per candle-power-hour, we have the electric arcs coming out far cheaper, in point of illuminating power, than the high-pressure gas-lamps. The figures

are for the electric arcs (table No. 2): Average candle-power 937, total cost per lamp per annum £30, total cost per candle-power per annum 7·7d., and total cost per candle-power-hour 0·00195d; while for the Sugg high-pressure gas-lamps, the figures are (table No. 1): Average candle-power 459, total cost per lamp per annum £18 5s., total cost per candle-power per annum 9·5d., and total cost per candle-power-hour, 0·00241d. Such comparisons as these to show the want of reliability in these figures could be made *ad infinitum;* and consequently we cannot accept them as a fair comparative criterion. At the same time, there is much in the tables in the way of definite figures that are very acceptable. We refer to the columns showing the capital cost of lamps and the total cost per lamp per annum, with the intermediate ones. In all these respects, the electric arcs are put out of the field as compared with high-power gas lighting, and also, it may be added, as regards efficiency when judged by the demonstration which every night is given to the wayfarer in our London streets. It is not, however, every street that requires either high-power gas-lighting or electric arcs; and the tables impart some valuable information from actual costs in regards to ordinary incandescent gas lighting and flat-flame gas lighting, in which the latter makes a shameful showing. We leave these two tabulated statements to the judgment and further investigation of readers by reproducing them in their complete form.

The final report which we have to notice is perhaps the most interesting of the three. In this, Mr. Bradley presents some exceedingly instructive detailed particulars of the cost and methods of street lighting which at present obtain in the various districts of the City of Westminster. Much explanation will be saved, and intelligibility will be served, by reprinting the first of the tables in this report, showing comparatively the cost of street lighting in the various parishes:—

Parish.	Mileage.	Cost of Gas Lighting.	Cost of Electric Lighting.	Total.	Cost per Mile of Street Lighting.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.
St. George .	42¼	232 0 0	21,914 0 0	22,146 0 0	*524 3 4*
St. Margaret	25½	5,108 13 6	—	5,108 13 6	*200 6 10*
St. Martin .	8½	1,099 14 6	2,800 0 0	3,899 14 6	*458 16 0*
St. James .	11½	2,184 11 2	1,977 10 0	4,162 1 2	*361 18 4*
Strand . .	11¼	6,552 0 6	—	6,552 0 6	*582 8 0*
Totals .	99	15,176 19 8	26,691 10 0	41,868 9 8	**422 18 3*

* Average cost per mile throughout city.

In all cases but two, the number of burning hours per annum is 3940; and the exceptions are in the case of the Strand district gas lighting, in which the number of hours is 4300 (which, it will be remembered by readers of the report published last week, Mr. Bradley advises should be reduced to the 3940 hours' scale), and in the case of the electric lamps in the parish of St. Martin, which are alight from sunset to sunrise. Now, in studying this table, the report published last week (p. 425) will serve as a key to the character and extent of the lighting in the various parishes. In examining the figures, we will deal with the Strand district first as the figure appearing under the heading of "Cost per Mile of Street Lighting" is the highest in the table—£582 8s., and the entire lighting of this district is by means of gas! But excepting two or three isolated examples of high-pressure gas lighting, this district has adhered to the old flat-flame form of lighting. It has paid, and is paying, dearly for its preference, and the figures are fearfully condemnatory. They may, however, serve the good purpose of carrying conviction home to other local authorities, and influence improvement in lighting. Beyond that, they are of no value in present-day comparison of rival forms of illumination. In the other four lines, we find some interesting facts. The first is that the more electricity there is used in the lighting of a given area, the higher the cost per mile; and this is a point that should forcibly appeal to all public lighting authorities. There are three of the districts in which electric light is more or less used in conjunction with gas. Of these three, St. James's has the least electric lighting; the cost per mile of the total street lighting—gas and electricity—is £361 18s. 4d. St. Martin's is next in the ascending scale; and the cost per mile of the total street lighting is £458 16s. St. George's has almost entirely dismissed gas from the streets (the outlay on gas lighting now only amounting to £232, out of a total of £22,146). The result is that the cost is £524 per mile! Omitting the backward and benighted Strand district, this cost is altogether out of proportion with all the others. In St. Martin's and St. James's the gas lighting is partly on the incandescent system. But we have left the best line to the last—that is St. Margaret's. There the cost is only £200 6s. 10d. per mile; and the parish is entirely devoted to incandescent gas lighting. Set this figure against any of the other instances in which electric lighting is used, and a surprising result is obtained, and a remarkable testimony in favour of incandescent gas lighting. St. Margaret's has 25½ miles of streets, which cost, by incandescent gas lighting, £5108 to illuminate; and St. George's has 42¼ miles of streets, which lighted by electricity requires an expenditure of £22,146! Let those who are anxious to learn whether the extra expense of £324 per mile is justified, visit the districts, and judge for themselves; then those who require to improve the gas lighting of their districts may point to the fact that it costs £1400 more to light 11¼ miles of the Strand district by flat-flame burners than it does to light 25½ miles of St. Margaret's by means of incandescent gas lighting. Mr. Bradley himself emphasizes this point in a few notes appended to the table. He says: "The cost per mile in the Strand district is higher than any of the other parishes, although, in comparison with the St. Margaret's and St. Martin's incandescent gas-lamps, the illuminating effect is considerably less. A Strand 15-feet flat-flame burner, costing £9 8s. 10d. per annum, gives a candle-power of 55, as against a St. Margaret's plain single-mantle lamp, consuming 4·2 cubic feet per hour, and costing £3 10s., giving 58-candle power, and a St. Margaret's Sugg high-pressure lamp giving 500-candle power, and costing £18 5s. per annum."

It must be admitted that the cost per street mile is not in itself an exact or sufficient basis of comparison between the different systems of street lighting as regards efficiency; for, of course, much depends upon the height of the lamps above the road surface, and the greater or less frequency the lights are placed along the streets. But, at the same time, much depends on the efficiency standard one takes. There is such a thing as ultra-efficiency in public lighting which may mean waste of public money. Some may take the total cost per candle power per annum, or the total cost per candle-power-hour, as their standard of efficiency; but, in order to arrive at a very high level of efficiency according to this standard, it may be necessary to adopt high-power lamps, which, taking other standards of efficiency, may not be so suitable for certain situations and streets. To adopt a high-power lamp where a single incandescent gas-lamp would afford an ample illumination would be absolute extravagance, and yet, per unit of candle power, the expenditure for the high-power light would be lower. Take St. George's and St. Margaret's, we shall require a lot of convincing before believing that the ratepayers of the former are getting their money's worth in service, efficiency, or anything else by paying £324 more per mile of street than the ratepayers of the latter, although the cost per candle-power-hour or candle power per annum may be lower.

In the few notes succeeding his tabular matter, Mr. Bradley gives us an insight into what he considers is the acme of artificial lighting. He prefers as few traffic-impeding lamp columns as possible; and we agree with him that artificial lighting should be, in character and general effect, that which gives a diffused light as near as possible to daylight. He pursues this point by remarking:

> Can it be said, that artificial light, which only illuminates the ground surface satisfactorily, and a stratum of space say 10 feet in height above the ground surface faintly, is all-sufficient? I think not, especially in the centre of the Metropolis; and certainly a lamp with a height of 20 feet would appear to be a minimum requirement, as giving light, not only at ground level, and on the top of an omnibus, but through a stratum 20 feet thick. Whatever the source of light is, it should certainly permit of a general diffusion of illumination through such a limit as this. As Piccadilly Circus and other open spaces are now lighted, so eventually I believe it will be regarded as normal lighting to have every City street lighted similarly; finality being only reached when street surfaces and building façades are in equal relief, sun up and sun down. To effect this, or to attempt to attain it, each single illuminating unit in the lighting scheme must be equal to the present average electric lamp in height, and gas and oil would greatly gain as effective highway illuminants if old types of columns and hoods were boldly discarded, burners grouped to give say from 700 to 1000 candle power and placed at the head of 20 to 22 feet columns of modern artistic design.

If Mr. Bradley intends these remarks to have general application, then they are open to controversy; and the extent to which there can be agreement depends entirely upon location—as to space and other circumstances. While we agree that a lamp should be of fair height to secure good diffusion, it would be far from us to admit as generally necessary the suggestion made in the final lines of the quoted paragraph. The Sugg lamps in Whitehall are not 20 feet high; but we maintain that their effectiveness as illuminating sources is far greater than the electric arcs on the ugly, tall columns at the other end of Whitehall. However, the prospect of reaching Mr. Bradley's conception of what public lighting should be is remote; and so we welcome the further remark that "in streets where gas is used, it would appear advisable to replace plain burners by incandescent mantles, ordinary and high pressure, and in particular double or more powerful lights might be used with great advantage in many situations." Mr. Bradley's statistical reports are certainly full of interest and instruction.

Carbon Monoxide as a Product of Combustion of the Bunsen Burner.—At the last meeting of the Chemical Society, Dr. T. E. Thorpe presented a paper on the above subject, in the course of which he said that, during an inquiry into the nature of the combustion products of certain of the gas and oil stoves in common use, he had had occasion to make observations on the behaviour of the bunsen burner as regarded its liability to evolve carbon monoxide when burning under an ordinary laboratory sand-tray. He found that a burner fed with coal gas at the rate of 6 cubic feet per hour, and under 0·95 inch pressure, would evolve about 0·022 cubic foot of carbon monoxide, when burnt under a sand-tray in such manner that the inner cone of the flame impinged, or apparently impinged, on the metal.

ELECTRIC LIGHTING MEMORANDA.

The Affairs of the Premier London Electric Lighting Company—Sound Business Methods—The Question of Depreciation in Regard to Tramways—The Place of the Electric Tramway.

EVER since electric lighting from central stations became a commercial enterprise, the pride of place in this business has belonged to the St. James's and Pall Mall Company. The undertaking has never had any set-back, and its profitable working has served as the lure that has attracted small local authorities in all parts of the country, often to their own financial discomfiture. Wherever the peripatetic consulting electrician has gone on his advisory way, assuring town councils of sleepy Suffolk or Somersetshire boroughs that there was in local electricity supply a mine of wealth awaiting exploitation by their enterprise, he has never failed to cite in glowing phrase the inspiring example of the Pall Mall and St. James's Company. Theirs is indeed a fruitful inheritance, and they have cultivated it well. In the course of twelve years, the Company have connected up 2077 consumers, with the equivalent of 232,685 lamps, in an area that might be covered, so to speak, with one of the club tablecloths of this favoured spot. This is done by the expenditure of 4380 kilowatts, or considerably less than 6000-horse power—about the capacity of a very modest steamboat set of engines. The Company use £450,000 capital, of which only £200,000 is ordinary shares, upon which 14½ per cent. is paid. The revenue from electricity supply amounts to one-fourth part of their total capital; and their total costs of working are about 50 per cent. of the revenue. The gross profit, before providing for capital charges, is 15·31 per cent. on the capital outlay; and 5·94 per cent. on the capital is set aside for depreciation, reserve, or written off.

The above is something like commercial success and financial soundness. There is no nonsense about the Company's way of doing business. They have the splendid advantage, denied to the gas company with whom they are competing, of being able to charge exactly how and what they please. The practical outcome should be a lesson to those who are always crying out for municipalization, or penalty clauses, or some other nostrum to compel undertakers of public supplies to do their business to the satisfaction of their customers. Although the statutory maximum price of electricity is 8d. per unit, and there is nothing to compel the Company to refrain from pushing their "oppressive monopoly" to the utmost in this respect, as a matter of fact the average price obtained per unit sold for private lighting in this, the richest part of London, is only 4·03d. The Board of this Company might plausibly hold that, with such customers as theirs, the price of electricity does not really matter. But they are better advised. They know that price matters very much indeed when you are trying to do all the business within your reach; and accordingly their selling price is little more than half the authorized rate. Nor is this all. While abstaining from fancy methods of charging, to which some people pin their faith, the Board have found it to redound to their advantage to discriminate. Therefore, the charge for electricity in this wealthy district is 6d. per unit up to 4000 units per annum, and 4d. after. In order to encourage long use of lamps, basement lights are charged 3d. per unit up to 4000 units, and 2d. per unit after. The same rates are charged for power supplies, of which there cannot be many in this district of palaces. The result of this wise liberality and simple measure of consideration for the most profitable order of consumers is the prosperity of the undertaking, with its 14½ per cent. dividend for the year, and £25,335 set aside for the protection of the investment in various ways. Surely, here is a lesson which he who runs may read. It is full of morals too obvious to need drawing out at length. The facts are interesting; but their detailed explanations would be dull reading. We should not omit to state that for such street arc lighting as they do, which is little, the St. James's Company get £30 per lamp per annum, and the local authority keep up the lamp-posts. They do not mean to lose by this branch; but it barely pays at the price.

The question of depreciation crops up again very awkwardly in connection with the modern craze for the electricizing of tramways. The discovery has slowly dawned upon the perception of owners of tramways, and is proving a very discomforting one, that what is easily described as the conversion of a tramway to electric traction runs into costs which are not distinguishable from those of starting the undertaking all over again. Consequently, Sir Frederick Bramwell's "old iron" valuation of a tramway that has run out its time is more than justified, upon an entirely new and different ground from anything contemplated in the Tramways Act. The result is, obviously, that wherever there is a question of converting a tramway to electric traction, whatever may remain of the original capital cost has to be piled upon the back of the new undertaking—for such it really is. This is one of those discoveries that "give furiously to think," as the French have it. Another consequence flows from this truth, which is that it is always desirable to make the greatest possible extensions of a tramway system in connection with the conversion of the old lines. Otherwise, it is questionable whether the conversion will pay. The financial salvation of an electric tramway is its capability for dealing with more traffic than a horse line. It can go where horses could not work; and it can work a quicker service. If these considerations do not spell profits, there is no hope for the lines.

The financial considerations are not quite the same in the case of railways as with tramways. Indeed, they are altogether different. Railways have much more of their original capital represented by structures and permanent way, in return for which they have the great advantage of a road of their own, upon which they can do very much as they please. Railways can run to please themselves and their customers; tramways must run as other users of the highway allow them—an enormous difference. The most salient consequence of this condition of the railway service is that the speed can be much higher than is possible for tramways in most thickly-populated places. Having regard to what we remarked last week concerning the omnibus traffic in populous districts, it appears that the proper place of the electric tramway is between the omnibus and the railway. For short runs the omnibus is preferable to the tramcar, while for long distances the railway also beats the tramway. Whether the great railway companies will ever be able to work a paying electric service for suburban and town traffic in and out of their ordinary long-distance transportation is a question which is exercising all the boards at the present time.

THE SYSTEM OF MUNICIPAL GOVERNMENT.

Some Curious Revelations.

THERE are several stock arguments which are trotted out with unfailing regularity by the champions of municipal trading. Three of the principal ones are: The cheap terms on which corporations are able to borrow money, greater attention to the interests of the consumers than is displayed by private enterprise, and economy of management. Whatever truth there may once have been in the first of these arguments, there is very little left in it now, as a study of the prices at which recent loans have been issued abundantly proves. This is a plain question of fact, and therefore can safely be left to itself. The other two points, however, must be more or less matters of opinion; and many persons (ourselves included) have always doubted whether there is any real ground for claiming them as advantages appertaining to corporation control of commercial undertakings.

Municipal management should, of course, spell economy and efficiency; the theory is all right. But what is the experience? Has it ever been proved that a corporation are, in a given set of circumstances, able to do better for themselves or for anybody else than a company would do under similar conditions? Many municipal undertakings are excellently managed; but this does not of necessity happen. There are public bodies who seem unable, for some reason or other, to satisfactorily conduct the work for which they were originally created—let alone any of the self-imposed duties which it is now so fashionable to assume. One of these is the Dublin Municipal Council, who have lately been engaged in the thankless task of bringing into the full light of day the shortcomings of themselves or of their officials. Whatever may be the correct apportionment of the blame as between the Council and their servants—and this is not for us to decide—there must be something radically wrong with a system which permits of the existence of such a state of things as has lately been revealed. Of course, it would not have been possible for a moment—to say nothing of a great many years—if the councillors had taken a proper view of their responsibilities. But they did not do so; and what means can be devised for ensuring that they, and members of other similar bodies, shall do so? There is the joint in the municipal trader's armour. Though many splendid exceptions occur to us, town councillors are as a rule only too apt to perform their duties in an amateurish sort of way; and this is clearly about what has happened in the case now before us. The Lord Mayor of Dublin himself must have been of this opinion, when he remarked that "if the members of the Council undertook the duty of looking after the interests of the public, whom they represented, they should be prepared to do that duty with the same degree of care as if they were carrying on their own business." He added that, "so far as the important question of spending the money of the public was concerned, of giving employment, and seeing that that employment and work which was paid for should be properly discharged, they had the same right to devote attention to it and keep it under control as if it was a department of their own business."

The occasion of these incontrovertible statements was the presentation to the Dublin Municipal Council, at a special meeting held recently, of the first report of a Departmental Committee appointed as long ago as February last year "to examine into the working of the different departments of the Council, with power to examine all books and documents of the departments for the purpose of ascertaining whether greater efficiency or economy may be obtained;" and the Lord Mayor's text was the evidence given at the inquiry to the effect that the offices were overmanned, and that the Committees had no grasp of the spending of money or of the employment and dismissal of men. The Departmental Committee was a strong one (consisting, as it did, of two members of each of the Standing Committees, with the Lord

Mayor at its head); and up to the time of the issue of the present first report some thirty sittings have been held. The departments dealt with are the Secretary's office of the Paving Committee and Improvements Committee; the various works and employments carried out by both these Committees; the Secretary's office of the Markets Committee and the Water-Works Committee; the different markets, works, and employments respectively under their control; the Secretary's office of the Cleansing Committee and the Lighting Committee; the different departments and works conducted by them; the Secretary's office and staff of the Public Health Committee in all its departments; the Engineer's office; and the office of the Estates and Finance Committee as to its staff and the payment of wages to the employees of all Committees. There still remain many important departments to be inquired into; but the matters referred to above are, it must be acknowledged, quite sufficient for one report.

Dealing first of all with the secretarial department of the Paving and Improvement Committees, the Committee remark that Mr. O'Reilly's staff consists of six clerks; and this, they consider, is much in excess of the requirements of the office. In fact, Mr. O'Reilly admitted that he could dispense with the services of two clerks, if the selection was left to him. It was impossible to say with accuracy how many letters were received in any given day; but turning to the stamp book, and going over the entries for a fortnight, it could not be seen that the correspondence of the office averaged more than seven letters a day. Two of the staff appeared to be engaged exclusively in writing up the minutes (in the most elaborate detail) of the fortnightly meetings —one taking ten days to write up the minutes of the Paving Committee, and the other fourteen days to enter the minutes of the Improvements Committee. "These minutes are," in the judgment of the Committee, "kept in a manner which could only be justified on the ground that the office staff is so large as to render it difficult to find any means of keeping them employed." Passing on to the administrative branches of these two departments (which are attended to wholly outside the Secretary's office), it was found that Mr. Louis Lawless, of the Paving Committee, was assisted by five clerks, and that he was as completely divorced from the secretarial department—with whom alone the Paving Committee are brought in contact by their fortnightly meetings—as if they did not belong to the same Municipality. The conditions of employment in this important department are, the Committee of Inquiry think, most unsatisfactory. With regard to the number of men employed in each section, their transfer from one branch to another, the fixing of their wages, and their employment or dismissal, the Paving Committee exercise no control; and Mr. Lawless made it clear that they were not consulted. The Committee of Inquiry beg to be excused from giving an opinion on the general policy of allowing a free hand to the head of a department in the selection or dismissal of the workmen under his charge. In this connection, however, they make the following very significant statement:—

> Mr. Lawless admitted to us that, though the Committee exercised no control, he nevertheless was not a free agent, inasmuch as pressure was constantly brought to bear upon him by members of the Council and others to give employment to persons whom they recommended. Such a system has led, not only to unjustifiable extravagance, but to very great hardship on the employees themselves, who are always in peril of being displaced to make room for some person who can command a more influential recommendation. Mr. Lawless informed the Committee that he considered it his duty to keep the men in the employment as long as he could get money to pay them; and this would certainly seem to have been the policy adopted in several branches of the department, where he admitted, on examination before the Committee, he had a great many more men employed than there was any need for. . . . Your Committee are satisfied, from their examination, that positions have been specially created to give employment to certain individuals.

Truly a comforting state of affairs for the ratepayers to contemplate! No other conclusion, however, was possible in view of the evidence placed before the Committee. Indeed, Mr. Lawless said he had 56 men working where 34 would be sufficient.

Much the same condition of things was found to obtain in the administrative department of the Improvements Committee, where out of a permanent staff of 90 workmen in the Sewers Department, a very large proportion were wholly incapable of discharging any work, though they were maintained at the full rate of wages. The particulars show that many of these men had been for a great number of years in the service of the Corporation; but this can in no sense be said to justify the extraordinarily lax system that prevails. Out of seven bricklayers, four were, at the time of the inquiry, unable to do a man's work; and those incapacitated were the ones who were receiving the highest wages. Passing on to the Markets and Water-Works Committee, Mr. Power, the Secretary, on being questioned by the Lord Mayor as to what was the weekly net profit on the working of the abattoir, replied that he had not with him the book containing the balance-sheet, but that he would try to find out. This immediately brought upon him an indignant remonstrance from the Lord Mayor. "Have not our officers," exclaimed his Lordship, "sufficient interest in the business of the Corporation to be able to tell us, at any meeting, whether we are winning or losing by a particular department!" It seems not, though certainly overwork cannot be put forward as an excuse for the ignorance of which complaint was so reasonably made.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 496.)

THE improvement in the general aspect of affairs on the Stock Exchange which we were able to note a week ago, was fairly maintained in the earlier portion of last week; but then a change set in. The temptation to snatch profits was too strong to be resisted, and thus the rise was something more than checked. The adverse movement was aided by Paris sales of Consols to avoid stamp duty; and this influenced prices in many departments to move down-hill. The Money Market, too, was distinctly tighter, there being a strong demand, and again another Thursday came and went without any reduction in the Bank rate. Business in the Gas Market was only very moderate, and not even the big issue was galvanized into active movement. But still there was a good tendency prevailing, and several issues show some nice advances; while the adverse movements which one or two have been subjected to can be accounted for by their special circumstances, which do not touch the gas industry in general. So far from this being the case, each successive statement of accounts of a company as it appears illustrates how thoroughly well founded was our forecast that the second half of 1902 would prove to be a prosperous season for gas. In the Metropolis, in the suburbs, and in the provinces—everywhere the tale is the same. And we venture to predict that the current half year, *ceteris paribus*, will be equal to it. In Gaslight issues, the ordinary was quietly and steadily dealt in daily at 84, and a small margin above or below. The secured issues were quiet and undemonstrative. South Metropolitan, too, was a quiet market, and very steady—never moving outside 120½–121. Nothing at all was done in Commercials. The Suburban and Provincial group were not conspicuous, but some made nice advances, including Alliance, Brighton, Plymouth, and Sheffield. There was not much doing in the Continental Companies, and Imperial and Union were flat; but European had a further improvement, and Malta had the same. Nothing particular occurred in connection with the remoter undertakings. The Water Companies showed some flatness, and Southwark and West Middlesex receded. Kent have come to the end of their tether in the payment of back-dividends, all but the ½ per cent. they will pay next week; and then they will cease.

The daily operations were very level all through the week. On Monday, Imperial fell 1, and West Middlesex Water 5. On Tuesday, Brighton original rose 3, and European and Alliance new ½ each. On Wednesday, Plymouth rose 4, but Union fell 2½. On Friday, Malta rose ½; but Southwark Water fell 4. On Saturday, Imperial fell 1; but ditto debenture rose 2.

PERSONAL.

Mr. JOHN IRELAND, Assistant-Manager at the works of the Musselburgh Gas Company, has been appointed Manager of the Tranent Gas Company.

Accompanied by the best wishes of many friends, Mr. PHILIP C. HOLMES HUNT left England last Thursday for Marseilles, where he will join the *Orontes*, and proceed to Melbourne to take up his duties as Assistant-Engineer to the Melbourne Gas Company—an appointment he obtained towards the close of last year.

At a meeting of the Coventry Gas Department Sick Club held on the 14th inst., under the presidency of Mr. Fletcher W. Stevenson, the Engineer and Manager, a presentation was made to Mr. J. A. NOBLE, the Secretary. The gift consisted of a silver teapot, coffee-pot, and cream jug; also a china tea service. The President stated that the club was formed in 1884, and Mr. Noble had been Secretary from its formation, and had discharged the duties gratuitously. He was glad to see the members appreciated in such a practical manner the services Mr. Noble had rendered. Mr. Frost, foreman bricklayer, on behalf of the men, made the presentation, and asked Mr. Noble to accept it as a token of the esteem they all had for him. The inscription on the coffee-pot was: "Presented to Mr. J. A. Noble by the members of the Coventry Gas Sick Club. February 14, 1903."

The departure of Mr. ELI BULL from Pinner, on his retirement from the management of the gas-works there, was the occasion, on the 13th inst., of a tribute from the employees in the shape of a gilt Empire clock, which was presented to him in token of their respect for him. The presentation was made by Mr. W. Chaffer, who referred to the increase which had taken place in the consumption of gas during Mr. Bull's connection with the gas-works, which had extended over a period of 30 years, and to the estimation in which he was held. The clock bore the following inscription: "Presented to Mr. Eli Bull, on his retirement from the managership of the Pinner Gas-Works, by the employees, as a token of their regard and esteem, January 31, 1903." Mr. Bull, in returning thanks, expressed the hope that he might meet with as good a class of men as he had had under him at Pinner. If workmen were treated well, they would reciprocate, for they could not reject kindness; and he had always endeavoured to remember this fact. He hoped the men would do their duty to his successor in the same measure as they had done to him.

COMMUNICATED ARTICLES.

MR. GLASGOW ON THE WAR PATH.

By C. Dellwik.

Mr. Glasgow begins his article in the "Journal" for Feb. 10 with a reference to Mr. Westcott's letter to the "Journal" of Jan. 6, and remarks that "to meet claim with counter-claim has never appealed" to him "as a form of controversy." Judging from what follows, his pet form of controversy seems to be personal invectives and warped representations to exhibit the iniquity of his competitors. For this laudable purpose, he alleges that the business with which I am connected is conducted under false comparisons of its own merits and those of competing processes. Upon the still more personal allusions in Mr. Glasgow's article, I shall make no further comment than to point out that he does not hesitate to publish a very garbled version of a private conversation between Mr. Humphreys and myself, at which Mr. Glasgow was not present. Verily, in the cause of carburetted water gas, Mr. Glasgow proves himself a champion *sans peur*, though not *sans reproche*.

Mr. Glasgow's attitude seems based on the assumption that the term "carburetted water gas" should be interpreted in the narrow sense of meaning only water gas carburetted with oil to a comparatively high candle power. In the absence of any other generally accepted term, "carburetted water gas" may, however, be understood in a somewhat wider sense, and thus include water gas enriched by any suitable hydrocarbon (gas or vapour) to such degree that, in conjunction with coal gas, it forms a mixture suitable for all practical requirements. In this sense the expression has been used by what Mr. Glasgow calls "the Dellwik faction," but not (as he alleges) with a view to deceiving unsuspecting and credulous gas managers into a belief that blue water gas is the equivalent in illuminating and heating power of highly carburetted water gas. Such an interpretation, moreover, presupposes a gullibility in the average gas engineer which is anything but flattering to the profession.

Had Mr. Glasgow looked into the matter with less prejudice, he would have found that neither I nor, so far as I know, anyone else representing the Dellwik process in this country has failed to do full justice to the undoubted merits of the present form of the Lowe generator, nor to the advantages it has conferred upon the gas industry. But the Lowe process is designed for the production of a comparatively high candle power water gas; and now Mr. Glasgow apparently would have us think that only the advocating of such gas is legitimate. At the present time, and in spite of Mr. Glasgow's well-known opinions on the subject, the tendency of the gas industry is, however, towards a lowering in illuminating power and economy in gas production by obtaining the highest possible duty from the coal used. For this purpose, blue water gas has proved a valuable adjunct to coal gas manufacture. For this purpose, the "Dellwik process" is advocated by its supporters in a perfectly legitimate manner on its own merits, and without derogation of other processes.

Admitting the difference in the premises from which Mr. Glasgow's and my own views are derived, very little interest attaches to the arguments he advances in support of his vindictive statements. In my letter to the "Journal" of Jan. 13, I felt justified, in the absence of other data, in accepting the statement of the approximate cost of carburetted water gas given in "The Gas World Year-Book" for 1903, p. 165. The tabulated statements from fourteen gas-works as to the cost of producing carburetted water gas show that the cost of materials, labour, and water alone—*i.e.*, exclusive of charges for purification, wear and tear, and salaries—and with deduction of the value of bye-products, amounts per 1000 cubic feet to respectively: (1) 14·77; (2) 12·75; (3) 15·24; (4) 15·32; (5) 12·94: (7) 18·28; (8) 14·75; (9) 13·52; (10) 10·41; (11) 14·75; (12) 16·36; (13) 18·44; (14) 16·46; (16) 14·02. Of these, No. 10 is water gas, enriched with benzol, from a Dellwik plant. The cost for fuel, labour, and water for the blue water gas figures out at 3·59d.

At the large water-gas plant of the Manchester Corporation, which may be supposed to be worked economically, the report for last year (see "Journal," Aug. 12, p. 414) shows that on a make of 795,045,000 cubic feet of 18·54-candle power gas there had been used per 1000 cubic feet 46·52 lbs. of coke and 3·58 gallons of oil, or per ton of coke there were produced 48,000 cubic feet of carburetted water gas. If the coke is valued at 10s. per ton, and the oil at 2½d. per gallon, the bare cost of raw materials, without any charge for labour, water, maintenance, &c., would be 11·45d. per 1000 cubic feet.

By this I do not, by any means, wish to say that better results may not be produced with the Lowe generator, on a carefully conducted test. But the wide discrepancy between such results and those apparently usual on regular work may be largely due to what Mr. Glasgow in another portion of his article calls "the complex thermal side of the Lowe process."

On the other hand, blue water gas can be produced (and is produced) at a cost of 3½d. or less per 1000 cubic feet, including similar items to those mentioned above, as well as labour, but leaving out of the question such charges as are beyond the control of the constructors of the water-gas plant. And in several places, a considerable proportion of such gas is admixed, without further enrichment, with coal gas with perfectly satisfactory results.

The application of this method is comparatively recent, and naturally there has not yet been time to collect equally definite results as those obtained in the manufacture of coal gas or oil-carburetted water gas. But it has been amply demonstrated that by the method proposed by Professor Lewes, of introducing blue water gas into the coal-gas retorts, or by introducing it into the foul main, a considerable proportion of such gas may be mixed with the coal gas with a very slight reduction in candle power. Should an enrichment be desirable, a comparatively small amount of carburetting material (usually benzol) is required; but, in any case, a very material reduction in the cost of production of the mixed gas is obtained.

Passing on to the question of carburetting blue water gas with oil by other methods than the Lowe process, Mr. Glasgow very correctly remarks that the bulk of carburetted water gas is produced by this process. But he loses sight of the fact that several gas companies in the United States—and among them a large company in New York City—are using the Wilkinson process, and carburet the gas in retorts. An installation on similar lines has been made in this country at Cleethorpes. To be sure, there is nothing new under the sun; but considering the difference in arrangements, it is a wide stretch of imagination to say that the Tessié du Motay process has been revived at Cleethorpes.

This plant has been started to work only within the last few days, and therefore exact data regarding prolonged work are not yet available. But I will leave it to the reader to judge, and the future to determine, whether or not the construction is justified. I have the Engineer's (Mr. Brockway's) kind consent to publish the result of the first day's work, which was carried out under his supervision. The plant was worked only to three-fourths of its full capacity, and hence under very unfavourable conditions, especially as regards the fuel consumption for the carburetting plant. There were made in seven hours 76,000 cubic feet of 17½-candle power gas. The quantity of coke used in the generator was 20 cwt.; the coke used for the carburetting plant was 6 cwt.; and the oil used was 165 gallons. The oil used per 1000 cubic feet of gas was, therefore, 2·17 gallons, or a yield of 8 candles per gallon of oil.

The quantities of coke include refilling the fires to the proper level after standing over night (15½ hours) and clinkering. The generator had been worked on the day previous to the test, so that the fire was well settled before the commencement of work. These being the results of the first day's work, without any previous trial of the plant, and under adverse conditions, it is reasonable to suppose that still better results will be obtained. In any event, it would seem that Mr. Glasgow's prediction as to the hopeless inferiority of this installation is somewhat premature. I may add that the plant is worked by two men, including boiler firing for the entire gas-works.

From these results, and figuring the coke at 10s. per ton and oil at 2⅜d. per gallon (the present prices), Mr. Brockway estimates the cost of his 17½-candle power carburetted water gas at 10d. per 1000 cubic feet, including all charges for fuel, oil, labour, purification, water, maintenance, and salaries. Contrary to what is the case with the Lowe generator, there is very little possibility of any waste of oil with this type of plant through careless manipulation; and it is therefore probable that the cost of production on prolonged work will not exceed this estimate.

Mr. Glasgow has undertaken in his article not only to deny any claim to novelty in my process, or the results obtained by it, but, in the semblance of a legal light, he also disproves to his own entire satisfaction the patentability of the process he decries. His is, however, not the final authority to determine this question, and there exists a different opinion in certain other quarters. The German Patent Office, for instance, which makes very rigid search before the issue of a patent, granted and upheld this patent through all Courts of Appeal against the determined opposition of Mr. Glasgow's present German representatives, Messrs. Julius Pintsch. The Court of Appeal, in its final finding, lucidly summarized the controversy, and declined to be convinced by Messrs. Julius Pintsch's arguments, which Mr. Glasgow now recommends as such "interesting reading." The Examiners-in-Chief of the United States Patent Office, in granting the patent, have also put on record an opinion differing from Mr. Glasgow's.

There are many other points in Mr. Glasgow's article to which I might take exception. But they are not of general interest, when once it is understood that Mr. Glasgow makes himself the exponent of oil-carburetted water gas, which he has so successfully introduced into this country, while on the contrary my own efforts and those of my associates are in a different direction—viz., the introduction of blue water gas as an adjunct to coal gas manufacture, in a manner to necessitate a minimum of enrichment, and thus to cheapen the cost of production.

Mr. Glasgow decries the "latter-day prophets" who are engaged in this work ("false prophets" he calls them), and regrets that they may not be stoned for their heresies—*i.e.*, their differences of opinion from his own. It is human to desire the extinction of those who cause us inconvenience; and it is perhaps also human to desire the mode of extinction unpleasant in proportion to the degree of inconvenience caused. But, on his own showing, it is plain that Mr. Glasgow does not possess the Biblical qualification for throwing the first stone.

FANS IN GAS-WORKS.

By R. Gordon Mackay, Assoc.M.Inst.C.E., Member of the Berlin Section of the Society of German Engineers.

Part III.—Application of the Fan for Gas Exhausting.

The growth of a district, or the great increase of a gas company's consumers, and a natural repugnance to pulling out mains and putting down larger ones, makes it necessary to force more gas through the same mains, and calls therefore for a higher initial pressure. Oftentimes, also, the distant location of a gas-works from its consumers necessitates greater pressure than is possible to be derived from the weight of the gasholder. In some cases, the desirability for holders to be situated almost in the heart of populous districts, and conversely the decided undesirability of locating there the generating apparatus, makes it necessary to transfer gas from the works' holders to the consumers' holders in various party of a city. In this case, gas companies inclined to decorative architecture might so disguise the well-known features of the holder by an outer housing of imposing appearance, that, instead of the former being offensive to the æsthetic taste, it might even become an object of pride to its surrounding observers.

With a "booster" system of transmission, where the supply is at (say) every few miles or so repleted of its lost pressure, there would appear to be a possibility of supplying gas to even very distant stations. For the purpose of the increased pressure, the already installed rotary exhausters are not able to be used, owing to the extra vacuum that would be put upon the retorts, and the extra suction as well through the water seals of the purifiers. It is, of course, quite practicable to instal a further set of rotary exhausters to form the "booster." But although these rotary exhausters have, under the skilled hands of the specialist, greatly improved upon the puffing exhauster of some years ago, and have now developed into the silent running three or four blade exhauster, there is a tendency to apply fan exhausters to the purpose of maintaining the increased pressure required. In first cost, the fan exhauster is less, it is more economical in running, is able to handle a far larger volume of the gas, and combines with this the advantage of having a through passage, even when not running. It is capable of running at such a tip speed that a total pressure of as much as 26 inches of water may be exerted; and according as the resistance to motion approaches or departs from this figure, so is the amount of gas passed decreased or increased. In general, such a total pressure is not desired, though when forcing into a gasholder the back-pressure exerted by the holder may amount to as much as 12 inches; and when forcing the gas towards the consumers' mains, it must first overcome the governor on each main, and often the surplus gas must take a circuitous route back into the holder.

The ever-varying resistances make the history of its performances very difficult; but the fan exhauster has the undoubted merit of absorbing power in proportion to the amount of gas passed when running at the same speed. Formula (8) of the power taken by a fan demonstrates this. The quantity of gas passed depends upon the back-pressure; but if the designer knows the required volume Q and the back-pressure h likely to be exerted by the consumers' mains or the holder and mains, he can build his fan exhauster from a consideration of the formulæ

$$a = \frac{Q}{0{\cdot}65 \sqrt{2gh \frac{\gamma_0}{\gamma} \frac{459 + t}{459 + 32} \frac{1}{12}}} \qquad (7)$$

o the fan orifice $= 3{\cdot}1416 \times a$ (or see Table I.)

and u the tip speed of the fan-wheel from

$$Q = 0{\cdot}65\, o.\, a.\, u. \sqrt{\frac{2k}{a^2 + o^2}}$$

where

Q = cubic feet of gas per second.
h = back-pressure in inches of water.
a = equivalent orifice of system due to these two known quantities.
o = the required fan orifice for a certain ratio $\frac{a}{o} = \frac{1}{\pi}$.
u = the required circumferential speed of tips in feet per second;

and the following—viz.,

γ_0 = weight of a cubic foot of water, 62·3 lbs.
γ = " " " " coal gas at 32°.
t = temperature in degrees Fahr.
k = the manometric yield of the vanes.

Thus, from the practical application of these formulæ, it is possible to arrive at the required sizes of the fan-wheel. It seems, from practice, preferable to put one large fan exhauster rather than two working in parallel, unless the fans be fitted with fast-and-loose pulleys, so that one can be run without the other, If the two run for discharging gas from a main which is unable to meet their capacities at that speed, they work against each other; and to run both fans (one only having its valves open) is doubtless wasteful, because of the power absorbed when doing no work.

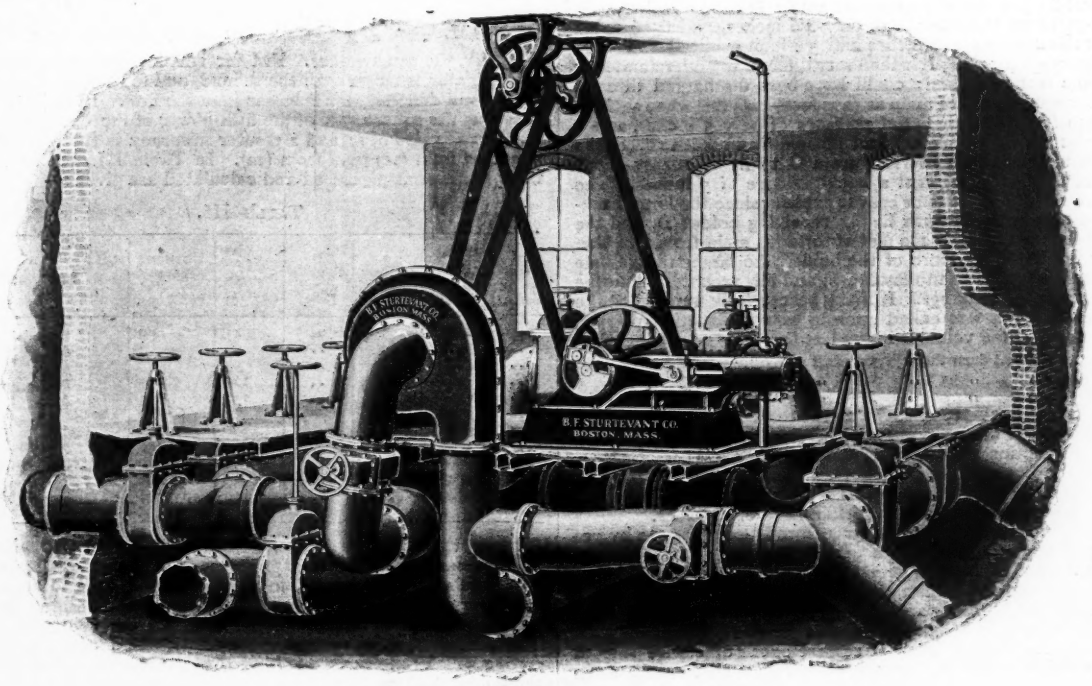


Fig. 10.

The principle of the fan exhauster is the same as of the fan blower; but whereas the latter does all its work on the discharge, the former has to divide its capabilities between the discharge side and the suction side. Of course, the back-pressure h must be the sum total of all the resistances to motion on both sides of the exhauster—which invariably has but one inlet. This is connected rigidly with the main from which it is desired to exhaust by an easy bend; the outlet also being connected with the submerged discharge main by another such bend, or, if desired, it may discharge directly below the floor merely by using a "down discharge" exhauster.

Fig. 10* shows an arrangement of a fan gas-exhauster for

* This illustration is from the catalogue of the Sturtevant Engineering Company, who kindly supplied the block used. Fig. 5 (*ante*, p. 229) was also from the same list.

TABLE II.

Mins. Duration of Test. 1	Gas Transferred from 2	Total Distance. 3	Distance, Feet. From Outlet of Holder to Inlet of Fan. 4	Distance, Feet. From Outlet of Fan to Inlet of Holder. 5	Pressure, Inches of Water. Initial Pressure of Holder. 6	Inlet of Fan. 7	Outlet of Fan. 8	Back-Pressure of Holder. 9	Loss of Static Pressure from Holder to Fan. Col. 6-Col. 7. 10	Loss of Static Pressure from Fan to Holder. Col. 8-Col. 9. 11	Effective Pressure of Fan. Col. 8-Col. 7. 12	Speed Revolutions per Minute. 13	Cubic Feet Gas per Minute. 14	Temperature of Gas, °F. 15	Temperature of Air, °F. 16
60	A to D	3550	3450	100	4·5	3·24	13·03	12·6	1·26	0·43	9·79	1105	4158	95	85
15	—	—	—	—	3·5	2·60	13·10	12·6	0·90	0·50	10·50	1210	4388	90	80
20	D to A	3550	100	3450	12·6	10·75	18·50	4·6	1·85	13·90	7·75	1125	11645	95	85
35	D to C	5300	100	5200	10·8	10·06	20·10	3·2	0·74	16·90	10·04	1114	6526	95	85
25	C to D	—	5200	100	3·3	0·00	10·40	10·1	3·30	0·30	10·40	1120	2852	95	85
25	A to C	8650	3450	5200	5·0	2·30	12·30	3·3	2·70	9·00	10·00	1127	5486	93	85
30	C to A	—	5200	3450	3·3	−3·30	6·70	5·0	6·60	1·70	10·00	1119	4571	95	85
20	B to C	11850	6650	5200	3·3	−1·30	10·60	3·3	4·60	7·30	11·90	1232	3650	90	80
10	C to B	—	5200	6650	3·3	−2·90	8·95	5·0	6·20	3·95	11·85	1215	4800	90	80

transferring gas from holder to holder, so as to maintain a full supply of gas in holders in some cases situated at considerable distances from the generator station. The arrangement is similar to that adopted by the Chicago Gaslight and Coke Company, where tests were carried out by the Company's Engineers of the amounts of gas transferred from four holders—which, for present purposes, may be known as A, B, C, and D, and were of necessity at different distances from the exhauster. About 3450 feet of 30-inch main connected A with the fan; the path being fairly direct. B was 6650 feet from the fan; the pipe being 30-inch diameter, and after half-way, 24 inches. Then 5200 feet of 24-inch diameter main, of a very crooked path, connected C with the fan. D was practically at the side of the fan-house; being connected to the fan by 100 feet of direct 30-inch main. The inlet and outlet of the fan exhauster were each 24 inches diameter; and the specific gravity of the gas was approximately 0·6 that of air.

The writer has rearranged these figures in order to clearly show the actual losses of pressure due to the resistance exerted by the mains between the holder and the fan inlet and the fan outlet and holder. In almost every case the initial pressure of the holder was sufficient to force the gas into the exhauster without the latter exerting a suction. Before starting work, the fan was driven at 1120 revolutions per minute with the inlet and outlet valves closed, giving a pressure against its closed outlet valve of 9·2 inches of water.

It is difficult to criticize such figures; but it is noteworthy that the two highest volumes were given under the most favourable circumstances—viz., 11,645 cubic feet per minute were discharged when the fan sucked only over 100 feet length of 30-inch diameter main, and had an initial pressure at holder D of 12·6 inches, with a back-pressure at holder A of only 4·6 inches, and 6526 cubic feet per minute with 10·8 inches and 3·2 inches initial and back pressures respectively. It is then very difficult to understand how 5486 cubic feet per minute could have been discharged through such a tortuous length of main as 5200 feet—and this when sucking over 3450 feet with an initial pressure of only 5 inches, and a back-pressure of 3·3 inches. Still more difficult is it to reconcile the next test, when transferring from C to A, when 4571 cubic feet were discharged against a back-pressure of 5 inches. The lowest reading of 2852 seems easy to explain, since the large back-pressure of 10·1 inches was in the receiving holder D, and the fan had drawn through 5200 feet of tortuous main from C. The greater the initial pressure of the holder, the larger the volume of gas from which the fan may draw; and this probably has some bearing upon the readings. It must be carefully noted that the only time the fan was called upon to exert its suction powers, was on drawing the volumes in the last three tests as follows:—

4571 cubic feet draw through 5200 feet with a loss of 6·6 inches.
3650 " " " 6650 " " " 4·9 "
4800 " " " 5200 " " " 5·2 "

In concluding the above remarks on the tests of the fan exhauster, as used by the Chicago Gas Company, and previous to entering upon a description of the fan exhausters, and their performance, used by the South Metropolitan Gas Company, the writer proposes to indulge in a few remarks anent the quantity of gas passed through the mains by a certain head of pressure.

Although loss of head or back-pressure is caused even by gas flowing through a straight pipe of smooth bore, the real loss in such cases under consideration is from the artificial resistances actually put into the path of the flowing gas by tortuous routes, from sharp bends, from partial change of direction in the passage of the governors, and from such causes even as the accumulation of naphthalene on the internal surface of the otherwise smooth bore, and eddies due to syphons. Now, since all formulæ seem to refer only to the passage of the gas or fluid through straight pipes, it follows that the theoretical determination of such frictional losses for a tortuous or twisted main is extremely difficult. In Part II., when referring to the back-pressure caused by air passing through smooth steel or cast-iron pipes, the writer made bold to point towards formula (9) as an approximate solution to the determination of this back-pressure; a right-angle bend and right-angle outlets being considered as equivalent to a length as much as forty times the diameter of the pipe. It is strange to find so many of these sharp bends and outlets on even modern gas-works, causing as they do such great expenditure of power to make up the consequent losses which are due to such faulty design. Unwin's formula for the flow of a fluid through a pipe with a certain head may be modified into the following form:—

$$\text{Weight of gas passed in lbs. per minute} = 60.\ D.\ Q. = 87 d^2 \sqrt{\frac{D.\ h_2\ d}{L\left(1+\frac{3\cdot6}{d}\right)}\cdot\frac{5\cdot2}{144}}$$

where D = weight of 1 cubic foot of the gas in pounds,
Q = quantity in cubic feet per second,
d = diameter of pipes in inches,
h_2 = head in inches of water,
L = length in feet,

which may therefore be written as

$$\text{Cubic feet per second} = Q = 0\cdot275\,.\,d^2 \sqrt{\frac{h_2\ d}{D.\ L\left(d+\frac{3\cdot6}{d}\right)}}$$

$$\text{or in cubic feet per hour} = 1350\ d^2 \sqrt{\frac{h_2\ d}{1\cdot8\ D\ L\left(1+\frac{3\cdot6}{d}\right)}} \quad (10)$$

Comparing this formula with that of the late Dr. Pole given in the "JOURNAL"* in 1852—viz.,

$$\text{quantity in cubic feet per hour} = 1350\ d^2 \sqrt{\frac{h_2\ d}{s\ (l+d)}} \quad (11)$$

where

l = length in yards,
s = specific gravity of gas (air being 1),

it is found that the two denominators—viz., $\sqrt{1\cdot8\ D\ L\left(1+\frac{3\cdot6}{d}\right)}$ and $\sqrt{s\ (l+d)}$—give, for 3 inches diameter, the same values. But for smaller diameters the first denominator is larger than the second, and for larger diameters the second denominator is larger than the first. In (11) the flow varies as the square root of the fifth power of the diameter for a fixed large value of l; and a greater accuracy is therefore to be expected from (11) than from (10). In Table III., the values of the quantities as measured and calculated are given:—

TABLE III.

d Diameter Inches	h_2 Head in Water.	s Spec. Grav. of Gas.	D Density at 90° Fahr.	l Length Yards.	Measured Quantity Cubic Feet Per Hour.	Q from (10).	Q from (11).
0·62	1·34	0·559	0·04	41	99	61	99
..	..	..	..	62	83	50	81
..	..	..	..	93	74	40	66
..	..	..	..	119	57	36	58
..	..	..	..	138	53	33	54
18	1·00	0·4	0·029	1,760	66,000	102,000	69,000
4	3·00	..	..	10,560	852	1,340	1,140
0·5	1·25	..	..	10	120	74	129
26	0·80	0·42	0·03	3,130	103,000	173,000	114,000
..	2·25	..	..	4,300	175,000	246,000	166,000
..	0·475	..	..	4,300	80,000	113,000	76,000

From the foregoing table, formula (11) is seen to give an approximate resemblance to practical results throughout; whereas formula (10) is evidently incorrect when applied to coal gas, whatever it may be when applied to steam. It is almost impossible to attempt to verify formula (11) from the figures given in Table II.; but, as an example, take test 1, which lasted one hour, during which time 249,480 cubic feet of gas were transferred from the holder A through 3550 feet of 30-inch main to holder D, with a loss of pressure of 1·69 inches aq. Then

$$\text{Cubic feet per hour} = 1350.\ 30^2 \sqrt{\frac{1\cdot69\times30}{0\cdot69\ (1183+30)}} = 346{,}000$$

a fair approximate figure when it is remembered that the main, though described as direct, has of necessity bends in its course; and if the straight length and bends together were considered as equivalent to 2000 yards of direct main, then the calculated value becomes equal to the value obtained.

(To be continued.)

* Vol. II., p. 352.

TECHNICAL RECORD.

A WOODEN GASHOLDER TANK.

Readers of the "JOURNAL" are aware that we have been able from time to time to lay before them, by the courtesy of correspondents, records which carry the mind back to the early days of gas lighting, and assist the present generation in forming an idea of the appliances then in use for the manufacture and distribution of gas. To-day we are in a position to reproduce an interesting item in the history of gasholder tank construction which has been placed at our disposal by Mr. R. W. Wilson, the Secretary of the Imperial Continental Gas Association, among whose archives it has lately been discovered. It is a tender for the erection of a wooden tank, and it was submitted on the 10th of May, 1825, by Messrs. Young, Son, and Wingrove, of Southwark. Readers familiar with the contents of "King's Treatise on Coal Gas" will doubtless remember that, in the chapter dealing with the early forms of tanks and holders, it is stated that the rectangular shape was in use up till 1815, when the cylindrical form was adopted. This, however, necessitated the construction of tanks of larger dimensions than those previously employed, and considerable difficulty was experienced in erecting them. It is recorded that "wooden vats, similar to those used by brewers," were utilized; and that "a second-hand vat was purchased by the Chartered Company, and fixed as a tank at one of their works." Of course, as pointed out by Mr. Newbigging, in the work above mentioned, the durability of these vats was very limited; for the slightest leakage of water speedily destroyed the hoops, when the vessel would suddenly burst, and "cause considerable annoyance." The last vat was removed from the Brick Lane works of the Company in 1843.

With this brief introduction, we turn to the offer of Messrs. Young, Son, and Wingrove. It was sent in compliance with the "desire" of the Directors of the Imperial Continental Gas Company (this was in the days anterior to the now familiar "tender" advertisement); and a hope is expressed in the opening paragraph that it will meet their approbation. The firm then proceed to make their offer, as follows: "We will undertake to prepare, in all respects ready for erection, a gasholder tank of the following dimensions—viz., 40 ft. 8 in. diameter at top, 42 ft. 8 in. diameter at bottom, and 18 feet deep all within, containing about 4180 barrels of 36 ale gallons, to be made of well-seasoned 3-inch fir staves and bottom (the planks of the bottom in one length), with fir joist, to be secured with 28 stout hoops of the best scrap iron, with an oak or elm kerb, 6 inches by 4 inches, fitted round the top, and with the bolts requisite to secure the same." The tank was to be erected on the premises of the firm, and properly marked for re-erection at the place of its destination. The price was to be "two shillings and sixpence per barrel," or about £520; and the firm undertook to prepare the tank ready for shipment within a month from receiving the order, provided they were favoured with it not later than a week after the date of the offer. This interesting document bears out the account given in the "Treatise;" and quaint features of it are the statement of the contents and the calculation of the total cost on the basis of "barrels of 36 *ale* gallons."

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

The members of the Association held their third annual dinner on Saturday, at the Albion Hotel, Manchester; and there was an exceptionally good muster—upwards of forty (including guests) sitting down, with the President (Mr. S. E. Halliwell, of Littleborough) in the chair. The Association continues to make steady and satisfactory progress. During the past year, notwithstanding some withdrawals, the membership increased from 49 to 57; and financially the position is equally good. The visits to gas-works of special interest to the members included those at Rochdale, Southport, Leigh, and Blackburn; and the gas-engine works of Messrs. J. E. & H. Andrew at Stockport were inspected. The attendance of members at the meetings when special papers were read was satisfactory; and there is every indication that the opportunities thus afforded for obtaining useful information on various points connected with the manufacture and distribution of gas were fully appreciated. The Council of the Association have had under consideration the means of still further increasing the facilities that may be provided for assisting the members in securing a thoroughly practical training for their profession; and with this end in view the matter has been brought before the Institution of Gas Engineers and the North of England Gas Managers' Association, with every probability that some arrangement may before long be found practicable that will greatly enhance the educational advantages of the Association.

At the annual dinners, the members desire that conviviality rather than speech-making shall be the special feature; and the gathering on Saturday was no exception to the rule. A fairly full programme of vocal and instrumental music, with humorous recitations, had been arranged, to which both professional artists and amateurs contributed, while the speeches were condensed into the smallest possible compass. Mr. Garlick, in proposing the toast of "The President," referred briefly to the services he had rendered to the Association, and congratulated the members on having at their head one who took so active an interest in all that concerned the welfare of the Society. The President, responding to the toast, which had been received with the greatest enthusiasm, said it had been a pleasure to do anything he could in the interests of the Association, and in the future he would be only too pleased to do all he could to render any service that might be of assistance to the members. Mr. M'Donald proposed "The Manchester and District Junior Gas Association and the Vice-President." The Association had, he said, done much valuable work in helping forward young men who were entering upon their career as engineers in the important branch of industry with which they were specially identified; and, judging by the past, he felt quite certain the future success and increasing usefulness of the Association were fully assured. Mr. Garlick, in the absence of Mr. Hill, of Stalybridge, responded, and said their earnest endeavour was to make the Association fully representative of the junior branch of gas engineering, and to widen its scope of usefulness to those who were directly connected with the manufacture and distribution of gas.

GERMAN PROGRESS IN THE RECOVERY OF CYANOGEN FROM GAS.

The German technical journals, notably the "Journal für Gasbeleuchtung," have recently contained a number of interesting communications dealing with processes for the extraction of cyanogen from coal gas. It will be convenient to reproduce the substance of these articles in a consecutive account, in the course of which some cognate matter derived from other sources can be referred to.

The relatively small demand for cyanides in the past led to the question of the recovery of cyanogen from coal gas being much neglected; but during the last ten years, the great quantities of potassium cyanide required for the extraction of gold from poor ores have completely altered the conditions of supply and demand in cyanogen products. It seems certain that for yet another decade at least a continual increase in the supply will be called for. But notwithstanding the growth in requirements, and the consequent demand for raw materials from which the cyanide can be produced, the price which gas-works receive for their cyanogen constantly falls. This is strange, because the extraction from gas has not grown at the same pace as the call for the cyanides. One reason is that in the last ten years a whole series of processes have been elaborated for making potassium cyanide synthetically—in some cases from ammonia, in others from the nitrogen of other bye-products, and in yet others directly from the nitrogen of the atmosphere. The fact that these processes not only have succeeded in meeting the increased demand for potassium cyanide, but have even brought about a lowering in its price, indicates that the synthetical production of cyanogen can be carried on at a profit. It must not be concluded that gas-works were unable to supply sufficient cyanogen products to meet the growing requirements.

The following table is given by Herr W. Feld, to show the yield of cyanogen from different gas-works. The tests were made after the gas had passed the tar-extractors, but before it had entered the ammonia-washers.

—	1000 Cubic Feet of Gas Contain Cyanogen Equivalent to the Given Number of Ounces of		
	Hydrogen Cyanide.	Prussian Blue.	Potassium Cyanide.
German Gas-Works—Maximum .	2·20	3·893	5·296
,, ,, Minimum .	3·40	6·016	8·185
English Gas-Works	2·35	4·167	5·659
French ,, ...	2·26	4·000	5·442
Average	2·55	4·500	6·145
Or, per ton of coal carbonized (say)	~~48·6 lbs.~~	~~85·8 lbs.~~	~~117 lbs.~~

See p. 639

A gas-works therefore which carbonizes 50,000 tons per annum, produces, by gas making, on the average cyanogen equivalent to about 90 tons of potassium cyanide. Estimating the annual requirements of the world in cyanogen products as equivalent to 10,000 tons of potassium cyanide, this quantity would correspond with the gasification of about 6 million tons of coal per annum. The quantity of coal now gasified by the larger gas-works throughout Europe much exceeds this total.

Now, as, in the face of this surplus of cyanogen in the gas, synthetical methods of producing potassium cyanide have achieved success, there must be special reasons to account for it. Either the recovery of the cyanogen from the gas must be very expensive,

or the form in which the crude cyanogen is obtained must be one ill-adapted for working up further, or, thirdly, the methods by which the crude cyanogen obtained is worked up to potassium cyanide must be very imperfect. As the recovery of the crude cyanogen from the gas, if effected in the oxide in the purifiers, costs nothing, and, if effected in the washers, costs very little, only the two other possible alternatives remain. In fact, the fault is that while the cyanogen produced at gas-works and coke-ovens considerably exceeds the demand, nevertheless the synthetical processes not merely develop, but even considerably depress the price which gas-works can obtain for their crude cyanogen. The question is how does this arise. The price obtained by gas-works for their crude cyanogen (prussian blue) at the present time is, when calculated as for potassium cyanide, only about 15 to 20 per cent. of the selling price realized for the pure potassium cyanide. There is, of course, the cost of the potassium for combination with the cyanogen (which amounts to about 15 to 20 per cent. of the selling price) to be met by the maker of potassium cyanide.

The question of primary importance to gas-works in this connection is, in what form must the crude cyanogen be recovered that it may be best adapted for subsequent working up, and may secure for the gas-works a larger share than hitherto of the profits of potassium cyanide manufacture? This is the question which Herr Walther Feld, of Linz-on-the-Rhine, proceeds to discuss in a communication which was originally presented at the meeting of the Association of Gas and Water Engineers of Lower Saxony last autumn, and has recently been published in the "Journal für Gasbeleuchtung." An English patent, No. 26,396, of 1901, was applied for on the 24th December, 1901, by the same gentleman—this time described as a manufacturer, of Hönningen, a small place on the Rhine about 5 miles above Linz—for "Improvements in, and relating to, the Recovery of Hydrocyanic Acid from Gases." It will be convenient to refer to the specification of this patent in the course of the following digest of Herr Feld's paper on the cyanide question.

It is remarkable that, while there are many new processes for the recovery of cyanogen from coal gas, most gas-works in Germany are content to recover cyanogen in the old-fashioned way in the oxide used for purification, which means that it is left to chance how much of the cyanogen will be recovered. This conservatism must be attributed presumably to the new processes not having achieved what was expected of them. Nearly all the new methods for washing cyanogen from gas are based on the one which is casually presented in the course of sulphur purification—viz., recovery of the cyanogen as a compound with iron. The facility with which such compounds are formed when compounds of iron and compounds of cyanogen are brought together, and their stability, are the factors which have contributed to the iron cyanogen compounds being retained as the basis of systems of cyanogen washing. These iron cyanogen compounds are only surpassed in stability, while in alkaline or neutral solution, by mercury cyanide; but they surpass even this in regard to the smaller degree in which they are decomposed by sulphuretted hydrogen and acids.

It was recognized long since that the formation of the iron compounds—ferrocyanides—is favoured by the presence of alkalies, yet the procedure casually presented continued to be followed exclusively, and the small return of cyanogen which oxide purification afforded was regarded as adequate. De Vigne was the first to attempt, in 1884 (German patent No. 27,297), to improve the recovery of cyanogen by adding alkali to the ferric oxide purifying material. But he went further, and tried to improve the absorption by utterly useless additions to the material; thus showing that he had not grasped the chemical characteristics of cyanogen absorption. Knublauch, in 1888 (German patent No. 41,930), indicated the proper way when he specified that the cyanogen was to be absorbed by liquids, in which alkalies, ammonia, or alkaline earths and ferric oxide were dissolved or suspended, instead of by solid material. All later processes, in which iron compounds are used in conjunction with the oxides, hydrates, sulphides, and carbonates of the alkalies, ammonia, the alkaline earths, and magnesia, are based on Knublauch's system. This process, however, has only succeeded in being introduced into practical use in isolated cases. The reason lies—according to Herr Feld—solely in the wrong explanation put upon the phenomena of the absorption, and in the wrong employment consequent thereon of the process which, in itself, is sound.

Dr. Leybold deserves the chief credit for having, in a treatise on "Cyanogen in Gas Manufacture," in 1893, pointed out why the amount of cyanogen present in oxide used for purification was so small. In consequence of the conclusions which he drew, such an increase was achieved in the recovery of cyanogen by means of the oxide, that further improvement by the adoption of the Knublauch washing process did not seem peremptory. The conclusions which Dr. Leybold drew from his work were substantially: (1) In order to favour the absorption of the cyanogen in the purifying material (oxide), and in order to secure a high proportion of prussian blue in that material, the passage of the gas through the purifiers must be very slow. Large purifiers imply material rich in prussian blue. (2) In order to increase the yield of cyanogen in the purifying material, the gas must be as nearly as possible freed from ammonia before it enters the purifiers. Good ammonia washing is of the utmost importance for securing a good yield of cyanogen.

It is by no means rare in badly-operated gas-works for spent oxide containing only 2 to 4 per cent. of prussian blue to be obtained, and for the yield of cyanogen to be scarcely 40 per cent. of the total present in the gas; while in well-operated works, where Dr. Leybold's suggestions are followed, oxide containing 10 to 12 per cent. of prussian blue, and a yield of 75 per cent. of the cyanogen, are obtained. For small gas-works, such a yield may be regarded as quite satisfactory, the more so as it could only be increased at a comparatively great expenditure for enlarging the purifiers. However, as already observed, spent oxide really affords a form of crude cyanogen material which is very ill-adapted for the production of potassium cyanide. On the one hand only a comparatively small amount of crude cyanogen is contained in a large quantity of the material; while, on the other hand, the chief constituents of the latter, and especially the sulphur, are very troublesome in preventing the production of a clean product. For very large gas-works especially—such as those in England and France which carbonize over a million tons of coal per annum—it is of great importance to keep the sulphur purification entirely distinct from the cyanogen recovery. The cyanogen should be recovered by as simple a process as possible, quite independently of the sulphur purification, and in a form which lends itself well to subsequent working up. The most advantageous form in the latter respect is realized by obtaining the crude cyanogen as a soluble ferrocyanide. Knublauch, indeed, aimed at, but did not fully achieve, this consummation. At best 80 per cent. of the cyanogen is obtainable by his process in a soluble, and 20 per cent. in an insoluble form. Such a product, on account of its want of uniformity, is even more troublesome to work up than a wholly insoluble one. As at that time the cause of the formation of blue had not been precisely made out, these early endeavours to obtain the cyanogen entirely in a soluble form were given up; and the aim was until recently to obtain as high a percentage as possible of prussian blue in the washer by applying Knublauch's directions.

It will be appropriate now to consider the cause of the formation of prussian blue, and why it is accomplished in Knublauch's process. The blue may, according to its character, be formed in two ways. According to the nature of the absorbent, either ferric ferrocyanide (which is prussian blue proper) or ferrous cyanide (which is known as prussian white) will result, or else mixtures of the two. The ferrous cyanide, when the fouled oxide is revivified by the oxygen of the air, is converted gradually into prussian blue. The product called "blue" in the fouled oxide, is, as Dr. Leybold has already pointed out, a varying mixture of the two compounds of iron and cyanogen. Now it is well known that new oxide at first only absorbs cyanogen very slowly, later more rapidly, and at the last slowly again. Revivified oxide, on the other hand, absorbs at first much more rapidly than new oxide. Regarding new oxide as at first consisting only of ferric oxide, and under the influence of sulphuretted hydrogen gradually being reduced to ferrous oxide, and finally converted into sulphide, the following explanation would be in consonance with the facts of the case.

Ferric oxide does not absorb hydrocyanic acid to any extent, while ferrous oxide *per se* absorbs it, and forms insoluble prussian white. If, however, ferric oxide is mixed with ferrous oxide, the former behaves towards the latter as an alkaline base, and its presence favours the absorption of hydrocyanic acid by the formation of double ferric ferrocyanides. Thus there is formed ferric ferrocyanide—the proper prussian blue. Sulphide of iron, on the other hand, is not able *per se* to absorb hydrocyanic acid, though there is a common impression to the contrary. But if sulphide of iron comes into contact with gases which contain oxygen and hydrocyanic acid, sulphur is separated, though only gradually, and the hydrocyanic acid is absorbed. Similarly, a mixture of sulphide of iron and ferric oxide absorbs hydrocyanic acid, while sulphur is separated. What happens in the purifiers may be therefore shown by the formulæ:

(1) $Fe(OH)_2 + 2HCN = Fe(CN)_2 + 2H_2O$
(2) $4Fe_2(OH)_6 + 6Fe(OH)_2 + 36\,HCN = 2Fe_7(CN)_{18} + 36H_2O$
(3) [*a*] $Fe_2(OH)_6 + FeS = 3Fe(OH)_2 + S$
[*b*] $3Fe(OH)_2 + 6HCN = 3Fe(CN)_2 + 6H_2O$
(4) $O + FeS + 2HCN = Fe(CN)_2 + H_2O + S$

Thus, whereas the formation of blue is a primary action from ferrous oxide, or from a mixture of the two oxides, it is a secondary action when only sulphide of iron is present. This explains why the absorption becomes slower before the purifiers are about to be emptied. The reason why revivified oxide from the first absorbs hydrocyanic acid more readily than new oxide is likewise explained by the above equations. The revivified oxide contains a mixture of the ferric and ferrous oxides.

In the Knublauch process of absorbing the hydrocyanic acid by mixtures of alkalies or alkaline earths and iron compounds, the formation of blue is dependent on similar actions; the alkaline materials used always contain ferric hydrate. Through ignorance of the action which occurs in the formation of blue, care has not been taken to use only material free from ferric oxide for the absorption. As an illustration of this, Herr Feld refers to the Knublauch process as modified by Mr. Foulis at Glasgow. The latter precipitates ferrous chloride with soda, and washes the precipitate with water in order to remove the sodium chloride which is formed by the reaction. Thus:

(5) $FeCl_2 + Na_2CO_3 + H_2O = Fe(OH)_2 + 2\,NaCl + CO_2$.

Both in the precipitation and in the washing the ferrous hydrate becomes oxidized to ferric hydrate. This is mixed with more soda, and put into the washer. The mixture used for the absorption therefore contains, in addition to excess of soda, ferrous-ferric hydrates. A part of the ferric hydrate is then reduced to ferrous hydrate by the sulphuretted hydrogen of the gas; but the still unreduced ferric hydrate immediately causes blue to be produced. The course of the absorption is as follows:—

(6) $4\ Fe(OH)_3 + 2\ Fe_2(OH)_6 + 2\ Na_2CO_3 + 24\ HCN = Fe_7(CN)_{18} + Na_4Fe(CN)_6 + 2\ CO_2 + 22\ H_2O.$

The product obtained contains about 20 per cent. of the cyanogen in an insoluble and 80 per cent. in a soluble form—*i.e.*, as sodium ferrocyanide. If it were not for the reducing action of the sulphuretted hydrogen, the proportion of prussian blue would be still greater, notwithstanding the excess of soda. It is essential, therefore, in order to avoid the formation of prussian blue, to keep the ferrous solution completely away from the oxidizing effect of the atmospheric oxygen during the precipitation of the ferrous hydrate. This can only be achieved by not mixing the ferrous salt with the alkali until it is already in the washer which is filled with gas. The two solutions must be introduced separately into the washer. Using ferrous sulphate and soda, ferrous hydrate free from ferric oxide is obtained, thus:

(7) [*a*] $FeSO_4 + Na_2CO_3 + H_2O = Fe(OH)_2 + NaSO_4 + CO_2.$

In the presence of the required excess of soda, the cyanogen of the gas is absorbed, and soluble sodium ferrocyanide is produced; while prussian blue and other insoluble cyanogen compounds cannot be formed.

(7) [*b*] $Fe(OH)_2 + 2\ Na_2CO_3 + 6\ HCN = Na_4Fe(CN)_6 + 4\ H_2O + 2\ CO_2.$

It is obviously essential to introduce into the washer the whole of the required alkali immediately the iron salt has been introduced, as insoluble prussian white would result if an insufficient proportion of alkali were present. The proportions indicated by Knublauch must therefore be maintained—*i.e.*, for one molecule of ferrous salt there must be available three molecules of a divalent alkali, such as lime, or six molecules of a monovalent alkali, such as soda.

(8) [*a*] $FeSO_4 + 3\ Ca(OH)_2 + 6\ HCN = Ca_2Fe(CN)_6 + CaSo_4 + 6H_2O$

[*b*] $FeSo_4 + 3\ Na_2CO_3 + 6\ HCN = Na_4Fe(CN)_6 + Na_2SO_4 + 3\ H_2O + 3CO_2$

[*c*] $FeSO_4 + 6\ NaOH + 6\ HCN = Na_4Fe(CN)_6 + Na_2SO_4 + 6\ H_2O$

If the ferrous salt were entirely free from ferric oxide, no trace of prussian blue would result. The correctness of the foregoing statements can readily be substantiated by a laboratory experiment. A Woulff's bottle is charged with 500 c.c. of water, and the gas (containing cyanogen) is passed through it until all the air is expelled from the bottle. Then, without interrupting the passage of the gas, there are introduced separately 800 c.c. of solution containing 100 grammes of ferrous sulphate ($FeSo_4 + 7\ H_2O$), and about 200 c.c. of milk of lime, containing 70 grammes of lime, (CaO). If the ferrous sulphate is not wholly free from ferric oxide, there should be added to the solution, before introduction, a few drops of sulphuric acid, and some shreds of sheet iron; and it should be warmed gently until the ferric oxide is reduced. A test, made in this way, but with the ferrous sulphate containing a small trace of ferric oxide, gave the following result: 100 grammes of the solution, mixed with sludge, contained

5·8 grammes of calcium ferrocyanide [$Ca_2\ Fe\ (C\ N)_6$] in soluble form = 98·76 per cent. of the absorbed cyanogen,

0·072 gramme of calcium ferrocyanide [$Ca_2\ Fe\ (C\ N)_6$] as prussian blue = 1·24 per cent. of the absorbed cyanogen.

Thus it is evident that, by employing ferrous salt free from ferric oxide, the precipitation of blue can be wholly avoided.

The next question is whether the absorption in the washer takes place rapidly and completely. Even if it might be assumed that the rate of absorption in the washers is more rapid than in the oxide purifiers, it must not be overlooked that the gas traverses the washer at much higher velocity than the purifier, which has so much greater cross section. Hence, notwithstanding much accelerated absorption, opportunity must be afforded in the washer for the gas to remain a given time in contact with the liquid. If, moreover, absorption takes place directly after the absorbent has been introduced, according to the equation (8), the conditions nevertheless are very soon altered. For instance, if lime is used as the alkaline absorbent, then, under the influence of carbonic acid and sulphuretted hydrogen, this lime is soon converted into carbonate and hydrosulphide, while the ferrous oxide is converted into sulphide. The calcium hydrosulphide is further gradually converted into carbonate. In place of the primary reaction shown by equation (8), there take place secondary reactions, just as in the purifiers after a time. Thus:

(9) [*a*] $Ca(SH)_2 + 2\ HCN = Ca(CN)_2 + 2\ H_2S$

[*b*] $CaCO_3 + 2HCN = Ca(CN)_2 + H_2O + CO_2$

[*c*] $3\ Ca(CN)_2 + FeS + H_2O = Ca_2Fe(CN)_6 + CaSHOH$

As sulphide of iron by itself (as already pointed out) can only absorb hydrocyanic acid by the aid of the oxygen present in the gas, there is formed in the first place calcium cyanide by the action of the hydrocyanic acid on the calcium sulphide and the calcium carbonate; but the decomposition of the calcium carbonate in particular takes place very slowly, as, by reversal of the action, carbonic acid can again decompose calcium cyanide. The calcium cyanide formed by one or the other action yields, with the sulphide of iron, by separation of sulphur, soluble calcium ferrocyanide. The action occurs somewhat more readily if soda is used instead of lime as the alkaline reagent, owing to the solubility of the soda. However, the absorption can be accelerated even with lime, if care is taken that some undecomposed lime is always present in the washing liquid. This can be attained by using a large excess of lime. But such an excess of lime would entail retardation of the stirring apparatus, and also if the whole of the absorbing material were introduced at once into the washer, would not long provide a large excess of lime, because the quantity of carbonic acid present in the gas is large in comparison with the hydrocyanic acid.

In a gas-works where about 17½ million cubic feet of gas were treated per twenty-four hours with lime and iron solution in the manner above indicated, the procedure would be to run off from the washer every twelve hours one-fifth of the liquid, and to run into the posterior section of the washer the same quantity of fresh absorbing liquid. Notwithstanding the lime being in excess by two-thirds of the quantity theoretically needed, there would only be absorbed in the one washer about 75 per cent. of the hydrocyanic acid contained in the gas. While the freshly added absorbent acts rapidly and well at first, absorption takes place very slowly towards the end, when the lime has been converted into carbonate and the ferrous oxide into sulphide. In order to secure complete and rapid absorption, it is therefore necessary to introduce fresh absorbent slowly and continuously to the washer. Such a mode of operating presents the advantage that the washer is not overloaded with insoluble material, as the insoluble absorbent is added freshly and freshly, while a portion of that which is contained in the material passes into solution through the absorption of hydrocyanic acid and the formation of calcium ferrocyanide.

From this explanation, it will be realized that the conditions requisite for the production of a soluble crude cyanogen product free from blue, and for rapid absorption, are:

1.—In order to obtain a soluble crude cyanogen exclusively, the absorption agents—*i.e.*, the ferrous salt solution and the alkali (soda, lime, &c.)—must be introduced into the washer separately. The two liquids must first mix when they are in the washer.

2.—In order to secure uniformly quick and practically complete absorption, the absorbing agents are to be introduced uniformly and continuously. They must not be introduced in large quantities at a time.

(*To be continued.*)

The Limits of Combustibility.—A communication by MM. L. Pellet and P. Jomini to a recent number of the "Bulletin de la Société Chimique de Paris" contains an account of experiments made by them to ascertain the determining factors of flame support or extinction. They concluded therefrom that it might be assumed that on the combustion of any body in a certain volume of air, the extinction of the flame—that is to say, the limit of combustibility—is a function of (*a*) the nature of the body, (*b*) the temperature of the flame, (*c*) the quantity of gaseous fuel introduced into the flame during unit time, and (*d*) the temperature of the surrounding air. The first three factors depend necessarily one on the other. Actually the quantity of gaseous fuel introduced into the flame during unit time stands in direct relation to the temperature of the flame and the nature of the body consumed.

Electricity v. Gas for Motive Power.—There has lately been formed a Leeds Section of the Institution of Electrical Engineers; and at a general meeting held last Thursday at the Yorkshire College, Mr. Harold Dickinson delivered an Inaugural Address dealing with the objects and advantages of the Institution. It was followed by a paper by Mr. R. A. Chattock, the Electricity Engineer of the Bradford Corporation, on "Motive Power Supply from Central Stations," in the course of which he dealt with the price of current as compared with gas. He said it would appear that the best method of charging was to base a sliding-scale price per unit upon the number of units employed per brake horse power installed per half year. Such charge might be graduated at 1d., 1½d., 2d., and 2½d. It was found that, compared with an engine using gas at 2s. 3d. per 1000 cubic feet, the cost of running a motor at 1d. per unit was considerably less—in some cases half that of gas, in others approximately the same. This, however, was owing to the motor being set to drive long lengths of shafting where the load was fairly continuous and heavy—an ideal drive for a gas-engine. Where the load was subject to great fluctuations, as was the case with crane and hoist driving, the electric motor, even at 2d. per unit, showed a great saving over the gas-engine. This was owing to the facility for stopping when not actually in use, and starting again when required. This could not conveniently be done with a gas-engine. In order, therefore, to show a saving over gas at the above figure per 1000 cubic feet the charge for current should vary from 1d. to 2d. per unit.

REGISTER OF PATENTS.

Gas-Engines.—Musgrave, B., of Heaton, near Bolton. No. 2417; Jan. 30, 1902.

This invention of "improvements in the construction of engines in which the motive power is obtained by the ignition of combustible mixtures of air and gas or oil vapour," consists in the employment of two or more combustion chambers communicating each through a valve with each motor cylinder, into which the charge to act upon the motor piston is first forced, then ignited, and afterwards admitted to the motor cylinder to expand and drive out the piston, which, upon its return stroke, expels the amount admitted. The charging of each combustion chamber takes place in successive order, alternating with the discharge of the other.

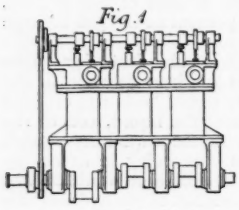


Fig.1

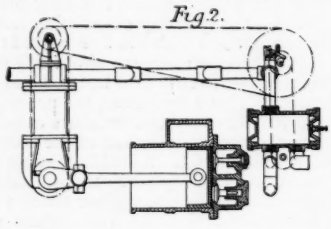


Fig.2.

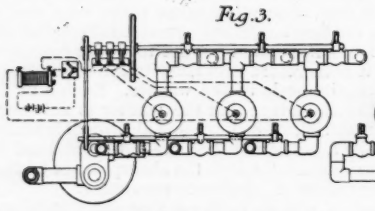


Fig.3.

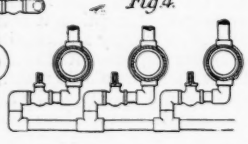


Fig.4.

In order to carry out this particular cycle of operations, a compressor (of suitable capacity) deriving its motion from the motor shaft is necessary. It draws its charge of air from the atmosphere, and the inflammable component produces the combustible mixture in the proper proportion from its source of supply, and then forces it into one or other combustion chamber through a valve. Each combustion chamber communicates with the motor cylinder through a valve, preferably operated by the motor shaft, and timed by gearing; and each motor cylinder has an exhaust valve similarly operated. The combustion chambers are provided with safety valves, and also with hand-operated relief-valves. The charges are ignited by tubes or by an electric spark. If by an ignition tube, the latter is operated and timed by gearing from the motor shaft in the usual way. In actual working, the motor is arrested by preventing the ignition of a charge in the combustion chamber, and by keeping the communication valve closed. It is always arrested when the piston of one cylinder has completed its exhaust stroke, and may be effected by any suitable device for preventing the valves communicating between the combustion chambers and the motor cylinder or cylinders from opening, and preferably one for preventing the ignition device from acting. The stoppage at the most effective point for restarting is facilitated by the tendency to produce a vacuum in the motor cylinder when the valves are closed. There is thus, in accordance with this particular cycle of operations, a charge in one of the combustion chambers which, when it is desired to restart, can be ignited by a hand-operated device—for instance, an electric spark produced on pressing a button, or admitting the charge to the ignition-tube by hand in conjunction with the opening of the valve communicating between the charged combustion chamber and the motor cylinder.

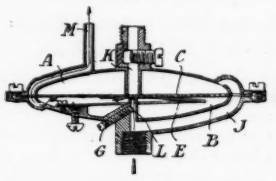
The illustrations show a three-cylinder motor having three independent combustion chambers. The motor is provided with one compression or force pump, and is adapted for electrical ignition of the charges. Fig. 1 represents an elevation of the motor looking from the combustion chamber. Fig. 2 is a view, showing the motor in side elevation and the force-pump and one combustion chamber in longitudinal section. Fig. 3 represents an elevation of the combustion chambers and force-pump looking towards the motor. Fig. 4 is a transverse section through the combustion chambers.

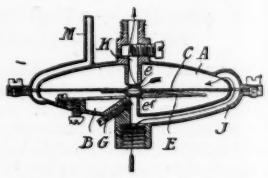
Gas Lighting Device.—Meier, G., of Berlin. No. 2655; Feb. 1, 1902.

This invention has for its object to so arrange the gas burner that the gas may be changed from the main burner to the bye-pass for the pilot-flame, and *vice versâ*, by the alteration of the pressure of the gas in the pipe.

In devices of this kind, the gas is usually either admitted to an imperforate diaphragm, which communicates on one side with the atmosphere so as to operate the valves of the main pipe and of the subsidiary pipe, in accordance with the variations of the pressure of the gas, or else the gas is admitted to both sides of a perforated diaphragm working in a similar manner—the gas-passages leading to the chambers above and beneath the diaphragm being so arranged that the moment the pressure of the gas is raised, the excess, acting upon one side of the diaphragm, causes the valves to be reversed. In such devices, gas escapes to the atmosphere if there be a leak in the diaphragm, whereas with the latter kind the slide-valves employed are apt to become choked and useless.

As shown, the device consists of two parts A and B, each provided with only one gas-inlet and one gas-outlet, and having no other opening or bore through which gas could escape in case of the diaphragm becoming damaged. The parts are divided by a diaphragm C (of any appropriate material) which, by a spring E, is normally pressed against the lower end of the pipe K leading to the burner proper. The large pipe J supplies gas to the upper chamber A, from which it ascends through the pipe K (fitted with a regulating screw) to the burner proper, while the narrow pipe L (with regulating screw G) supplies gas to the lower chamber B, whence it flows through the bye-pass to the subsidiary burner or pilot-flame.

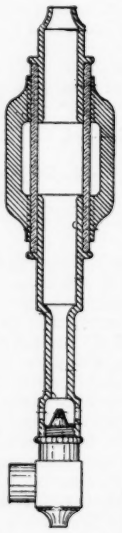




When the pressure of the gas is normal, the gas passes through the pipe J into the chamber A, and presses the diaphragm and the spring E downwards—thereby opening the lower end of the pipe K, and allowing the gas to pass freely to the main burner. At the same time, however, the pipe L is closed by the diaphragm or its obturator. If then the pressure of the gas falls, the diaphragm is no longer retained in its position above described, but will be pressed by the spring E against the mouth of the pipe K. This latter will thereby be closed; and the gas will pass through the chamber B and pipe M to the pilot-flame. By adopting proper proportions for the areas of the inlet and outlet pipes (beneath and above the diaphragm), any increase in the pressure of the gas will only be noticeable in the chamber A leading to the main or burner proper.

Bunsen Burners.—Smith, J. A., and Dick, M. & D. C., of Kilmarnock. No. 3538; Feb. 12, 1902.

This invention consists in improvements in burners of the bunsen type, with the object of adapting them to the use of acetylene, so as to obtain a flame of great and constant intensity with a comparatively low pressure and low consumption.



Hitherto in burners adapted to use acetylene, the full intensity of the flame has been of short duration and the consumption of gas wasteful, owing chiefly to the heat of the burner decomposing the gas before combustion, and to the high pressure used. The patentees, however, find that by preventing the conduction of heat from the nozzle of the burner to the mixing chamber, and by forming the latter with a passage leading thereto of certain relative proportions to accord also with the pressure of gas (which latter is determined by the size of the flame required) it is possible to overcome these defects.

A nozzle such as is used in a bunsen burner for coal gas, but having a finer orifice therein (adapted to the pressure and character of acetylene), is fixed opposite to the end of a straight tubular passage, so that the jet from the orifice is directed into the centre of the passage; an annular space being left around the nozzle and between it and the end of the tubular passage, so that an induced current of air is drawn into the tubular passage by the fine jet of gas. The nozzle may (as shown) be connected to the tube having the tubular passage above referred to, in the well-known way applied in ordinary bunsen burners. This tubular passage is approximately six diameters long in a burner working under 3 inches pressure of water. The end of the tubular passage terminates in a similar one of greater area—approximately between four and five times that of the first-named tubular passage, and approximately eleven diameters long—terminating in a contracted orifice forming the burner-nozzle. The burner may be chiefly made of some suitable heat non-conducting materials, such as porcelain and asbestos, in cases where there is not likely to be rough usage. Undue heating of the gas before combustion is prevented by forming part or all of the mixing chamber of heat non-conducting material and the remainder of the burner of metal. Metal being well adapted for the burner-nozzle, this latter is made as conveniently short or small as possible; and then in a burner of the approximate sizes as given, about 1 inch of non-conducting material (such, for instance, as asbestos) is fixed between the burner-nozzle and the remainder of the burner, so that communication is made through the non-conductor for the gas, forming an efficient check for the conduction of heat.

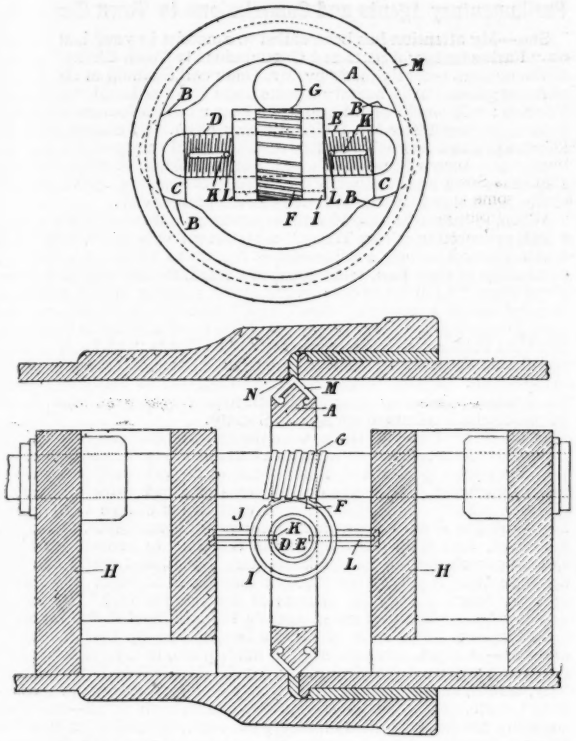
Caulking Pipes and Indicating the Position of Leaks.—Gordon, J. C., of Aldeburgh-on-Sea. No. 3739; Feb. 13, 1902.

This invention is intended to provide means whereby the operation named can be performed from the interior of the pipes, and without disturbing the soil or whatever covers them; and it is claimed to be "of particular value in dealing with water, gas, sewage, and like pipes which pass under buildings, river beds, or at a considerable depth from the surface of the ground—only one opening is necessary, and the caulking can be effected at any distance from such opening."

The proposal is to provide a chisel-pointed circular ring A divided into two parts at B, and made expandable by the insertion of two tongues C at the outer ends of the left and right handed screws D and E, which are free to work in opposite ends of the worm-pinion F, the tongues when pushed out entering grooves in the ring and completing the circle. The worm-pinion F is rotated by a steel tangent screw G running in brackets H, and is supported by the rings I having outstanding arms J the outer ends of which are inserted in the

brackets. In order to prevent the screws D and E rotating with the pinion F, there are provided in them slots K, in which are inserted the outer ends of pins L outstanding from the fore and aft brackets. Outside the ring A is a lead caulking-ring M.

All parts of the appliance are supported, where necessary, by rods outstanding from the brackets H; slots being provided where movement is to be arranged for.



The appliance is pushed to the joint N of the pipe it is required to caulk, the position of which in the case of a leakage in existing pipes has been previously located in the manner afterwards described. When in position, the ring A is expanded by rotating the screw G, which forces the lead M into the joint N between the spigot and faucet. When the joint is completed, the screw G is turned in the reverse direction, and the screws D and E drawn back into the worm-pinion F, which allows the upper part of the ring A to fall sufficiently to enable the appliance to be withdrawn from the pipe. Sufficient heat is applied when the appliance is in position to melt the lead and enable the operation to be performed with "run" or cold lead as may be desired. In such cases, spun yarn or other material may be first forced into the joint by the same apparatus.

In order to localize the position of leaky joints, a rubber band is passed round the ring of the caulking apparatus, which is then pushed in first past the first joint and the ring expanded. The operation is repeated at each joint, until the stoppage of the water down stream or the accumulation of water (if the leak is inwards) or escape of water (if the leak is outwards) indicates the position of the fault.

Hydraulic Sealed Centre-Valve for Working Gas-Purifiers.—Blakeborough, W., of Brighouse. No. 25,000; Nov. 14, 1902.

This hydraulic sealed centre-valve is so made that any one or more of the purifiers comprised in the set may be worked as desired while the working of the purifiers can be changed without moving a main portion of the apparatus and at the same time there is no liability to leakage. Fig. 1 is a vertical section, fig. 2 an elevation, fig. 3 a horizontal section on the line Y Z of fig. 1, and fig. 4 a horizontal section on line W X (with the upper portion removed in each case) arranged for a set of four purifiers.

The lower chamber of the valve is divided into two compartments—one I N for the main inlet, and one O T for the main outlet—and each of these compartments has upwards four valve openings A. The compartment I N has also a connection B for the main inlet-pipe; and the compartment O T has a connection C for the main outlet-pipe. The middle part into which the valve-openings A lead has again in its upper wall corresponding openings D, which can be closed by the same valve which closes the lower one. The middle part is divided into eight chambers by intermediate walls E; and each chamber has thus a valve-opening above and one below, and also an opening outwards for connection with the purifiers A^1, A^2, A^3, A^4, B^1, B^2, B^3, B^4.

The pipes A, which form the valve-openings from the lower chambers, are of sufficient length to allow for the required depth of liquid to form the seal for the valve F when these openings are closed. The valve is arranged to carry the required depth of liquid to form the seal when the valve openings D are closed; and these pipes are made of sufficient length to give the required seal. The upper portion of the valve may be made in four bridge-pipes in connection with valve-openings D, or as a chamber divided into four compartments. The valves are moved by suitable gearing. When they are up, they effectually close the upper openings by means of the hydraulic seal formed in the valve, and when down the lower one by means of the seal formed in the chamber.

A suitable arrangement of pipes and cocks I is provided to charge with liquid; and these are arranged so that the liquid will first flow into the space in the valve F and overflow into the chamber on the side of which a gauge is provided, so that the height of the liquid can be seen; while a syphon can be provided to guard against the possibility of the liquid overflowing into valve-openings A.

Fig. 1.

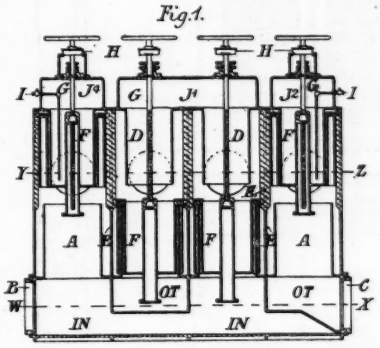


Fig. 2.

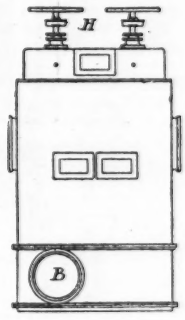


Fig. 3.

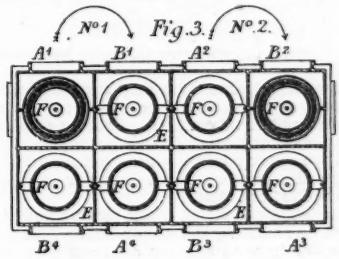
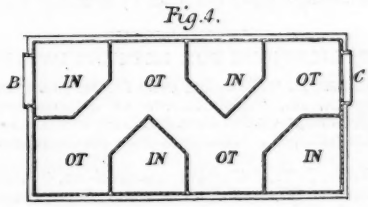


Fig. 4.



The eight branches for connections to and from the purifiers are so connected that the four sockets A which are on the chambers leading below into the part I N lead to the inlets of the purifiers, and the other four alternate ones B leading below into the part O T lead to the outlets from the purifiers. The four bridge-pipes J serve to make the communication (when the valves are down) between the outlet-pipes of the purifiers and the inlet of the next following one; while the inlet and outlet of one and the same purifier are separated by the intermediate wall E. When one of the lower valve-openings is closed up, the upper one is open; and, *vice versâ*, when the upper one is shut the lower one is open.

Fig. 1 shows the valve arranged to work two purifiers out of the set of four; and if the valve is set to work under these conditions, the gas enters through connection B into the inlet-chamber I N. Thus the valve F in connection with the chamber having the connection A^1 is raised by means of the screw, and the gas flows through this chamber and the pipe connected therewith to the inlet of purifier No. 1. Having passed through the purifying medium, it returns to the valve, which it enters through B^1; and the valve F in this chamber being down, the gas passes through the bridge-pipe J^1 into the chamber with the connection A^2. The valve F in this chamber being down, it passes through purifier No 2, and returns to the valve through the connection B^2. The upper valve opening in this chamber is closed, as the valve F is at the top, and the gas therefore passes through the lower valve opening into the outlet chamber O T, and leaves the valve through the connection C.

Rotary Washer-Scrubbers.—Chandler, J. & S., of Brixton, S.W. No. 12,515; June 2, 1902.

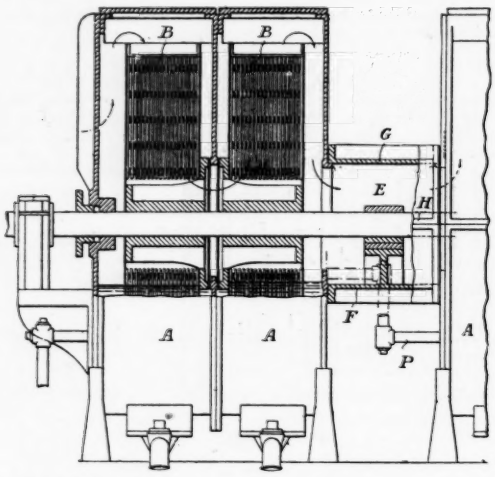
This invention relates to washer-scrubbers of the kind wherein a series of drums for carrying the wetted surfaces is arranged upon a revolving shaft having bearings between the bays; the object being "to provide for obtaining ready and easy access to the bearings, and to protect them as far as possible against the action of the gas or washing liquor."

To this end, spaces are left between the bays at points where it is desired to place bearings; and the apertures in the ends of the adjacent bays are connected by a tubular section, preferably formed in halves—the lower half being bolted to the end-plates of the adjacent bays and carrying the bearing proper, while the upper half forms a cover which

is attached to the lower part—see p. 484.

A are the bays and B the drums rotating therein; the drums being mounted upon a shaft extending through the entire series of bays, and at its end supported in bearings. E is the tubular connection between two adjacent bays; the lower portion F being fixed between the end-

plates of adjacent bays, while the upper portion G is provided with flanges adapted to be fixed by bolts to corresponding flanges on the lower portion and to the end-plates of adjacent bays. This lower portion has formed integral with it, or applied to it, a table or platform upon which the bearing for the shaft is mounted.



With this arrangement, should any inspection of a bearing be required, it is only necessary to remove the cover portion G of the tubular connection in order to obtain access to it. In order to prevent the escape of gas between the cover portion G and the adjacent plates, there are formed around the upper portion of the aperture over which the connection E is fixed flanges upon which the cover portion G and the connection can be bedded or jointed.

There is a lubricator connected to the bearing and cocks at the lower part of the bays for removing the tar or heavy liquor. The overflow from one group of bays to another does not pass through the connections, but through pipes (such as P) specially provided for the purpose.

APPLICATIONS FOR LETTERS PATENT.

3035.—Hosking, J., "Cleansing gases for use in engines." Feb. 9.
3060.—Haddan, R., "Manufacture of carbonaceous substances from tar." A communication from F. Ritter von Dahmen. Feb. 9.
3101.—Whitfield, C., "Manufacturing producer and water gas." Feb, 10.
3211-2.—Wood, J. T., "Gasolene gas-machine." Feb. 10.
3233.—Gregson, T., and Ramsbottom, R., "Incandescent gas-burner fittings," Feb. 11.
3243.—Clauss, H., and Schmandt, W., "Self-lighting device for gas-burners." Feb, 11.
3277.—Allen, H, and Henley, B. D. "Grouping gas purifiers and condensers and washers." Feb. 11.
3278.—Thwaite, B. H., "Production and distribution of fuel gas," Feb. 11.
3307.—Otto-Hilgenstock Coke-Oven Company, Ltd. "Coke-ovens." A communication from C. Otto and Co. Feb. 11.
3331.—Westphal, C., "Retort-furnaces." Feb. 12.
3455.—Canellopoulos, M., "Lighting and extinguishing gas-jets from a distance." Feb. 13.
3499.—Alexander, C. J., "Incandescent gas-burner." Feb. 14.
5540.—Ryland, T. J. F., "Incandescent gas-burners." Feb. 14.

Intensified Lighting in the Southport Market.—The lighting of Southport Market during the past year, on Sugg's intensified system, has led to an economy of 50 per cent. Against this, however, there is the cost of mantles, and also of the water; but with these calculated there is a saving of 20 to 30 per cent. The cost of the water is 9d. per 1000 gallons; and the expenditure on this head works out at about 3d. per hour.

"Atmospheric" Gas at Southport.—Two houses in Southport have been fitted up with independent installations of "atmospheric" gas. The generator is fixed in the cellar, and is connected with the water service. The small supply cylinder is filled with petrol, and the water then turned on. Though not stored, the gas is ready at a moment's notice. The proportion of air used is 98½ per cent. to 1½ per cent. of oil; and the cost of the gas is about 2s. per 1000 cubic feet.

Gas Suffocation Case at Belfast.—On Monday of last week, an inquest was held at Belfast on the body of Mr. Michael Jenkins (aged 74), who lost his life through an escape of gas. It appeared that on the morning of the previous day deceased's son, who was the first to rise, went upstairs to call his four daughters, who occupied the front room of the house. He found their bedroom door open, and noticed a strong smell of gas. At once he threw the windows open, and promptly called the girls, who fortunately were not unconscious. The gas, however, had had a severe effect on them, for they were scarcely able to force a way to the door. Mr. Jenkins then ran to the inner room, where his father slept, the door of which was also open. Here he was horrified to find the unfortunate gentleman lying on his back on the floor dead. An examination of the room showed that the deceased, who was in ill-health, had evidently been seized with a weak turn after rising from bed, and, clutching hold of the gas-bracket, had pulled it from its place. He had then fallen on the floor, and in a short time been suffocated. The Jury found that death was due to gas poisoning.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Parliamentary Agents and Commissions to Town Clerks, &c.

Sir,—My attention has been called to a notelet in your last number on "Parliamentary Agents and Commissions to Town Clerks" *apropos* of the charges recently made by Mr. Campbell Swinton at the Society of Arts against Parliamentary Agents and Clerks of Local Authorities. You say: "It would be interesting to hear what Parliamentary Agents have to say regarding Mr. Swinton's accusation." I cannot speak for all who practice as Parliamentary Agents; but I can speak for the Parliamentary Agents Society, of which I am the oldest member, and I can also speak with some authority on the subject from an active practice of the profession from the year 1845 to the present day.

When, in the sixth of the admirable papers on "Municipal Socialism" which appeared in "The Times," a statement was made, that "it is all but general among Parliamentary Agents to allow, on demand, a percentage of their fees, often equal to a third, to the solicitor who employs them," I felt it my duty as the oldest member of the profession to point out, in a letter to "The Times," that this statement required a very large qualification. I can add little to what I said in that letter, to which I refer you. It appeared in "The Times" of Sept. 11 last; and I was in hopes that, after its appearance there, such charges as are made by Mr. Swinton would have been regarded as applying only to the limited number of practising Parliamentary Agents who do not belong to the Parliamentary Agents Society.

In my letter, I said: "It was from the first and still is a fundamental rule of the Society, that no member shall allow any percentage of his business profits to Solicitor, Town Clerk, or any other official by whom he is instructed. This was done upon the broad principle that, in common honesty, no Parliamentary Agent should charge a bill against his client that admitted of deduction by way of commission." I urged, moreover, that it is the duty of the Solicitor to protect his client against overcharge by the Parliamentary Agent, and asked how this could be done, if it were the common interest of Solicitor and Parliamentary Agent to swell the amount of the agent's bill? I go further and say that no honestly stated agent's bill admits of the allowance of a commission. The scale of agent's fees, settled by Parliament, is a low one—in some particulars quite inadequate, in my opinion, to the important nature of the services rendered. His bill is liable to taxation; and if, as it should be, it is strictly in accordance with the established scale, it affords no margin for commission at all—and most certainly not for a commission of 33⅓ per cent., which I learn from Mr. Campbell Swinton's statement is the understood rate with the agents to whom he refers.

The allowance of these commissions is vicious. I will even join with you in calling it "immoral;" and the Parliamentary Agents Society have especial reason to regret its existence. They have suffered, and do now suffer, from it by the loss of old and valuable clients, whose business has been transferred to agents who give allowance of more or less liberal commissions. It is natural that public bodies and their Solicitors and Town Clerks, hearing of these allowances, should conclude that Parliamentary Agents can afford to make liberal abatements from their bills; and so these abatements are occasionally asked for now, which never were thought of before, and to which the proper reply is, if the client will not accept the bill tendered, his remedy is to have it taxed.

I said in my letter to "The Times," and I repeat, that the regret of the Parliamentary Agents Society at the introduction of this disreputable practice of commissions is not merely personal. "They have seen how much the profession of parliamentary agency has been discredited by the increase of the costs of appeal to a tribunal which can never be otherwise than costly," and also by the undue encouragement both of the promotion of Bills and of oppositions, "by the existence of a practice so open to abuse."

I have not consulted my fellow members of the Parliamentary Agents Society; but I think you may assume that what I have written indicates very clearly what they have to say regarding Mr. Swinton's accusation. "Let the galled jades wince; our withers are unwrung."

27, *Abingdon Street, S.W., Feb.* 20, 1903. Theodore Martin.

Mr. Glasgow on the War Path.

Sir,—In the "Journal" for the 10th inst., Mr. A. G. Glasgow has published a "statement," which, as you correctly remark, represents, instead of a statement, an attack on anyone who does not fall in with its author's views. The question has very little to do with blue water gas, but chiefly with other points.

With regard to blue water gas, I will leave it to the gentlemen interested in the matter to reply. There are, however, certain statements to which I must take exception—namely, that referring to the remarks made by Professor Lewes in 1893, at the meeting of the Institution of Gas Engineers, and the remarks made by him on March 14, 1902, in his lecture delivered at the Petroleum Institute. Comparing these two statements, Mr. Glasgow seeks to discredit the opinion of Professor Lewes.

I would like to ask Mr. Glasgow: (1) Whether or not it is true that, in the trials which he made at Beckton with his first set of apparatus, he used more than 6 gallons of oil per 1000 cubic feet of 22-candle power gas produced; (2) whether it is true that more than 50 lbs. of coke were used for every 1000 cubic feet of gas made. It seems to me that Mr. Glasgow has a very bad memory indeed. If he has no record of the facts himself, I would suggest that he should refresh his memory by inspecting the books of the Gaslight and Coke Company, where he will find that these statements are absolutely correct. I may remind him also of my own report to that Company in 1891, on the

experiments which I made for the first time with Russian "Solar" oil in Mr. Glasgow's apparatus. The result of the trials carried out by Mr. Glasgow with the apparatus he erected for his employers, the United Gas Improvement Company, were so unsatisfactory that I doubt very much whether the Gaslight and Coke Company would have even considered the erection of further sets. As it happened, the Kerosene Company, Limited, and the Tank Storage and Carriage Company, Limited, required me to try and introduce Russian "Solar" oil for use in the water-gas plant, three sets of which were then erected at Beckton; and, if I remember rightly, at that time only one set was ready for working. On behalf of my clients, I arranged with Mr. Trewby to have access to the results obtained by Mr. Glasgow when using American light oil; and I found that from 6½ to 7 gallons of this oil, and 50 to 60 lbs. of coke, were used by him for every 1000 cubic feet of 22-candle power gas produced.

I commenced my experiments with heavy Russian distillates, which I then had at my disposal, of a specific gravity of ·920; and after two weeks' trial, during which I made about 3 million cubic feet of gas, I was able, with the existing apparatus, to bring down the consumption of oil to 4·73 gallons per 1000 cubic feet, and to raise the illuminating power of the gas received to 25¼ candles, at the same time reducing the quantity of coke used. In the report submitted to my clients on the results of these experiments, I clearly indicated the lines on which the carburetted water-gas plant might be improved. I emphasized the importance of gasifying the oil separately, and the necessity of always preventing the gas tar, when received, from being mixed with water. Now, this report was communicated to Mr. Glasgow, and soon after he introduced an oil gasifier, which did not form part of the original plant, as well as an arrangement for separating the tar in a free state, which also had not been done before.

The foregoing remarks show that Professor Lewes was absolutely correct in the statement he made in 1893, and that Mr. Glasgow was scarcely just in concealing the actual facts.

Mr. Glasgow has used this opportunity of sneering at Professor Lewes for his carburetted hydrogen process. Now, I had the opportunity of making experiments with Professor Lewes's plant erected at Aldershot, and I can assure you that there is more originality in that process than in the one which Mr. Glasgow claims as his own; and if Professor Lewes had had the experience of our cousins across the sea as how to secure the support of gas engineers for his process, no doubt his success would have been greater than Lowe's. If the Lowe process has been adopted at a large number of gas-works in this country, it is chiefly due to the many improvements devised by the very able gas engineers of the companies in whose works the plant has been erected. Without these improvements, for which no credit is due to Mr. Glasgow, I am afraid the Lowe process would never have secured the position it now holds in the United Kingdom.

26, *Bevis Marks, E.C., Feb.* 17, 1903. P. DVORKOVITZ.

"Journal" Prices as a Basis for Tar Contracts.

SIR,—As a chemist frequently consulted on the value of gas products, I beg to draw your attention to the following circular inviting tenders for tar produced at the Bolton Gas-Works during the next three years, on a sliding-scale arrangement in which the contractor has to state how much he will give above the top "JOURNAL" price. This, I am informed, has resulted in tenders being received offering 30 per cent. above your top prices. I would not have troubled you with this communication, had it not been that another Gas Committee have issued a circular inviting tenders for tar on a similar basis.

The question arises: Are your prices based on what you consider the true value of tar at the time, or on actual sales of that article? If on the former basis, why have they not risen commensurate with the value or quoted prices of the finished products? If on the latter, what is to be the fate of a contractor agreeing to pay (say) 8s. per ton above whatever price you name. Would it not mean a continued rise in price of 8s. per ton every three months until the end of the contract? Until further light is thrown on this matter, I can only advise tar distillers to refuse to tender on this new basis.

Cheetham Hill, Manchester, Feb. 14, 1903. WILFRED IRWIN.

[ENCLOSURE.]

COUNTY BOROUGH OF BOLTON—GAS DEPARTMENT.

TENDER FOR TAR.

GAS OFFICES, BOLTON,

Jan. 12, 1903.

The Gas and Lighting Committee are desirous of receiving your tender for the purchase of the tar to be produced at their gas-works, during a period of three years from April 1 next, less a quantity not exceeding 10 per cent. of the whole, reserved for local sales. The estimated quantity will be 6000 to 7000 tons yearly; and the tar will be delivered into the Contractor's tanks at Craddock Lane or Bullfield siding of the Lancashire and Yorkshire Railway, Bolton.

The Contractor is requested to state, in the form below, the amount he is prepared to offer over and above an amount to be ascertained as follows—viz.: The highest quotations per ton of the price of tar to be taken every quarter, week by week, from the "JOURNAL OF GAS LIGHTING," and the average of these highest quotations for any quarter to be the sum regulating the price to be paid for the tar delivered during the then next succeeding quarter.

The tender, endorsed "Tender for Tar," and addressed to the Chairman of the Gas and Lighting Committee at the above offices, to be delivered not later than Thursday, the 22nd day of January, 1903; but the Committee do not bind themselves to accept the highest or any tender.

R. G. HINNELL, Town Clerk.

To the Chairman and Members of the Gas and Lighting Committee.

GENTLEMEN,

_____ hereby undertake to purchase the tar to be produced at your works during the three years ending March 31, 1906, upon the terms of the understated offer, and to pay *in advance* for the same at the rate stated below; and _____ also undertake to provide and supply empty tanks for the removal of the said tar, in such numbers as you may, in writing, from time to time request.

OFFER.

_____ offer you _____ per ton over and above the quarterly average as stated above.

Dated _____ 1903.

[Mr. Irwin's letter affords us an opportunity of repeating what we have said before—in the pages of the "JOURNAL" as well as to individual correspondents—with respect to the character and object of our "Current Sales" reports. The quotations are intended merely to illustrate the trend of the market in the various gas products, though at the same time, of course, all possible care is taken to ensure their accuracy. Surely the folly of basing contracts on prices given in the "JOURNAL" must be apparent to everyone, when it is remembered that there can be no compulsion upon us to continue for any stated period the publication of the quotations. Any week we may cease to insert the prices, and then what will be the position of those who have entered into long contracts on some such basis as is set forth on the Bolton Gas Committee's tender form? We trust that this warning may lead to the abandonment, wherever it now obtains, of so undesirable a method of fixing prices to be paid for residuals. Contracting on this basis is not, however, by any means a new idea, as Mr. Irwin supposes; for it is within our knowledge that many contracts are arranged in the manner set out on the Bolton tender form. But it has always been our wish to discourage the practice; and this we have done by every means in our power, short of discontinuing altogether the weekly publication of the quotations. So much for the tenders based on prices given in the "JOURNAL." With reference to the reliability of these prices, we can only say again that every possible care is exercised to render the "JOURNAL" fully worthy of the confidence of its readers. We cannot, however, be made responsible for any consequences of the publication of these quotations to individual buyers or sellers; and it must be distinctly understood that those who base their dealings upon them, do so at their own risk. There are special conditions in regard to the sale and delivery of residuals governing almost every place; and thus higher prices are justified in certain cases than could possibly be obtained in others. Under these circumstances, it is, of course, absolutely out of the question for us, or anybody else, to quote prices which can be considered as doing anything more than approximately indicate current values.—ED. J.G.L.]

Suggested New Gas-Stove.—The Air of Rooms.

SIR,—The suggestions made by Mr. Cleverly in the last number of the "JOURNAL" (p. 417) do not in any way accord with our experience, which is by no means small. In the first place, the ball fire which he recommends for the lower middle and working classes is one of the most expensive forms of gas-fire known, and far too costly in practice for the class of users to whom he refers. The combined fire and oven we made many years ago, and, as we expected, it proved an absolute failure for ordinary use, as for a great part of the year the chief advantage of gas cooking is that no fire is needed, and the kitchen can be kept cool in hot weather, irrespective of the much greater working cost of the combination. It has often been proved that a separate gas arrangement for each purpose is by far the most economical in practice; and for this reason all our combined ranges are made with the gas-fire and the gas cooking arrangements entirely independent of each other. An oven heated by the waste heat of a gas-fire is not only costly to use, but would never be employed in hot weather; and, further than this, it pays a company better to have two or three of the cheapest ranges on hire than one more expensive one at an increased hiring rate.

As regards ornament not being necessary, if Mr. Cleverly will go into any of the shops which supply the class of customers he refers to, he will find that it is considered very necessary indeed as regards sales. However vulgar and tawdry it is, the British workman's wife delights in a bit of fancy brass which she can polish; and it is not done on the cheap cookers now hired out by most gas companies, for the simple reason that the prices are cut to such an extent by competition that every farthing of cost has to be considered and excluded by the makers, if they are to pay expenses on this class of business, which is at present practically a bait to bring other business which compensates for starvation prices, if the work has to be properly done so as to last and not give trouble.

In the same number of the "JOURNAL," there is a "Note" on a communication in "Der Gastechniker" giving a method of moistening the air of rooms heated by close stoves which is not only very old, but appears to have gone out of use in this country a generation ago. The simplest methods, and the way to test the percentage of moisture, are given in my "Coal Gas as a Fuel;" and they have been copied at different times in most of the medical and other technical papers. The fact is that the methods of heating used in this country do not dry the air to any objectionable extent, and rarely have any tendency in this direction; and, under ordinary conditions, there is no need for anything of the kind. When moisture is required, the simplest and quickest way is to wet a blanket or sheet, wring out all superfluous water, and spread it on a small clothes-horse or towel-rail near the source of heat. This can be got ready in any room at a minute's notice. The distance from the source of heat regulates the rate of evaporation. The materials required are available in every house at all times, and the cost is

nothing. The percentage of moisture, if required, can be ascertained quickly by the method given in the book above referred to, absolutely exact figures to decimals not being needed, though they can be calculated for special purposes by the formula given in the standard text-books on the subjects.

Warrington, Feb. 20, 1903. THOS. FLETCHER, F.G.S.

PARLIAMENTARY INTELLIGENCE.

PRIVATE BILLS (SESSION 1903).

The third Parliament of King Edward the Seventh was opened by His Majesty in person, in full state, on the 17th inst. The speech from the Throne contained, as usual, reference to the several legislative proposals which, time permitting, will be introduced by the Government during the session; among them being Bills for improving the administration of the Port and Docks of London and the law of valuation and assessment.

With regard to Private Bills for the session, the Chairman of Committees of the House of Lords (the Earl of Morley) and the Deputy-Chairman of Ways and Means in the House of Commons (the Right Hon. Arthur F. Jeffreys) have had the customary conference to determine in which House the respective Bills should be first considered; and they have decided that the following should originate in the Upper House:—

Belfast Water Bill, Birmingham Corporation Bill, Bradford Corporation Bill, British Gas Light Company (Norwich) Bill, Bury and District Joint Water Board Bill, Chard Corporation Gas and Electricity Bill, Derby Gas Bill, Faversham Gas Bill, Harrogate Water Bill, Harrow and Stanmore Gas Bill, Hexham Gas Bill, Nantwich Gas Bill, Nantwich Urban District Council Bill, North Western Electricity and Power Gas Bill, Oldham Corporation Bill, Plymouth and Stonehouse Gas Bill, Rickmansworth Gas Bill, Scunthorpe Urban District Water Bill, Shepshed Urban District Gas Bill, Torquay Corporation Water Bill, Wellington (Salop) Gas Bill.

The following Bills will therefore originate in the Lower House:—

Barnsley Corporation Water Bill, Bath Corporation Water Bill, Billingshurst and District Gas Bill, Bournemouth Gas and Water Bill, Bridgwater Gas Bill, Broadstairs Gas Bill, Burgess Hill and St. John's Common Gas Bill, Commercial Gas Bill, Crystal Palace District Gas Bill, East Ardsley Gas Bill, Ebbw Vale Water and Improvement Bill, Gaslight and Coke Company Bill, Gaslight and Coke Company's Acts Amendment Bill, Gorleston and Southtown Gas Bill, Hampton Court Gas Bill, Hyde Corporation Bill, Ipswich Gas Bill, Kent Water Board Bill, Leigh Corporation Bill, London County Council (General Powers) Bill, Maidstone Gas Bill, Market Drayton Gas Bill, Merthyr Tydfil Urban District Council Bill, Nanty-glo and Blaina Water Bill, Nelson Corporation Bill, New Hunstanton Improvement Bill, Newcastle-upon-Tyne Electric Supply Bill, North Middlesex Gas Bill, Scarborough Gas Bill, Sheffield Corporation Bill, Sittingbourne District Gas Bill, Sutton District Water Bill, Walker and Wallsend Union Gas Bill, Wellington (Salop) Urban District Gas Bill, West Sussex Water Bill, Winchester Water and Gas Bill.

As usual during the early days of the session, a number of private members' Bills have been introduced, dealing with the following among other subjects: The rating of machinery, the regulation of coal mines, the charge of steam-engines and boilers, the establishment of wages boards, the provision of old age pensions, and the legalization of the peaceful conduct of trade disputes.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Wednesday, Feb. 18.

(*Before Mr. Justice* JOYCE.)

Lamplough v. West Kent Water-Works Company, Limited, and Another—The Question of Back-Dividends.

This action came on by way of motion, asking for an injunction to restrain the defendant Company, until the trial or further order, from paying dividends on any ordinary stock in respect of, or so as to make up, any deficiency or alleged deficiency on such stock, or shares represented by such stock, which may have accrued before June 30, 1864.

Mr. YOUNGER, K.C., and Mr. ASHWORTH JAMES appeared for the plaintiff; Mr. CRIPPS, K.C., and Mr. R. J. PARKER represented the defendants.

Mr. YOUNGER, in opening the case, said the action was brought to determine a very important question with regard to the affairs of the Company. In substance, it was whether, out of profits available for dividend, the Company were entitled, after paying the maximum dividend prescribed, to apply the surplus in paying the stockholders, or some of them, arrears, which it was alleged had accrued between the years 1809 and 1864, to an aggregate amount of about £700,000. It turned upon the effect of the incorporation into one of the Company's Special Acts, of the Water-Works Clauses Act, 1847, at a somewhat late period in the history of the Company; and it resolved itself into the question of whether the section of the Act which prescribed a maximum dividend was retrospective to the extent of authorizing the Company, after paying such maximum dividend, to make up, out of the surplus profits, arrears at a time when there was no maximum—when the Company could pay any dividends they could earn, and were under no restriction as to the charges they could make to the consumers. It would be necessary, in order to understand the position, to go briefly through the history of the undertaking and the various Acts obtained. The Company was incorporated in 1809, with an authorized capital of £150,000; but there were no limitations on the dividends or the charges. In 1811, another Act was obtained, extending the area, giving further powers, and authorizing the raising of additional capital. In 1850, another Act was obtained for the raising of a further £100,000, the holders of which were to be entitled to the same rights as to dividend, voting, &c., as the existing shareholders. In 1862, a further Act was passed, which recited the previous Acts, and authorized the raising of additional capital, bringing it up to £420,000. In 1860, the North Kent Water Company obtained parliamentary sanction; and in their Act the Water-Works Clauses Act was incorporated. Then, in 1864, came the Act which was most material. It was obtained by the West Kent Company, and by it amalgamation with the North Kent Company was effected, and the Water-Works Clauses Act, 1847, was incorporated. The important section of this Act was the 75th, which provided as follows: "The profits to be divided among the undertakers in any year shall not exceed the prescribed rate, or where no rate is prescribed they shall not exceed the rate of 10 per cent. per annum on the paid-up capital in the undertaking, which in such case shall be deemed the prescribed rate, unless a larger dividend be at any time necessary to make up the deficiency of any previous dividend which shall have fallen short of the said yearly rate." A subsequent section provided for any excess of profits, after paying the prescribed dividend and arrears, being invested to form a reserve fund up to the amount of one-tenth of the nominal capital of the Company, which might be utilized for making up deficiencies in dividends in future years, or to meet any extraordinary claim. Another section provided for accounts being deposited annually with the Clerk of the Peace, showing the receipts and expenditure of the Company, which might be inspected by consumers, and for the reduction of the rates or rents charged if the profits exceeded the prescribed rate. In order that the Company might get the benefit of the statute with regard to the arrears of dividends, they must not pay more than the prescribed rate of dividend; and after doing this, and providing for the reserve, they were bound to apply any surplus in reducing the price of water. The statute said nothing about making good a dividend when there was not a prescribed maximum; and, in fact, there could be no arrears unless there were a prescribed limit. His contention, therefore, was that the provision for making up arrears only came into force after 1864, when the Act of 1847 was incorporated. Since that date, the Company had been entitled to pay a dividend of 10 per cent. In their early years, they did not earn sufficient to pay this; but they had been doing so lately, and had been making up the deficiency. They had now reached the point when all the arrears since 1864 had been paid up, and they were proposing to pay others prior to that date.

Mr. CRIPPS remarked that the Water-Works Clauses Act was incorporated in the Act of the North Kent Company in 1860.

Mr. YOUNGER said the capital of the North Kent Company was comparatively trifling. The shares were £10 each, and on them £2 had been paid; and by the Act of 1864 the entire undertaking was vested in the West Kent Company.

Mr. Justice JOYCE said he thought any separate question as to the North Kent Company might be disregarded.

Mr. YOUNGER agreed. In any event, it would only be a question of two years' arrears on a very small capital. Section 27 set forth the provisions of the Act with regard to supp'y, water-rents, and all incidental matters, and specified that the provisions of the Water-Works Clauses Act should apply, after the passing of the Act, to the whole undertaking; and it included for the first time a maximum scale of charges. The total capital was raised to £600,000, and authority was given to borrow on mortgage. In 1877 came another Act enlarging the powers of the Company, and authorizing them to raise a further £160,000 by the issue of shares or stock, either ordinary or preference. Under this Act, the prescribed rate of dividend was 7 per cent.; and it was this stock which the plaintiff held, to the amount of £2500. The existing stock was entitled, by virtue of the Water-Works Clauses Act, to a dividend at the rate of 10 per cent.; and it was provided that if the profits were not sufficient to allow of the full dividend being paid on each class, they should abate rateably. Fortunately, this contingency had not arisen. There was a further Act obtained in 1888, which recited all the previous ones, and gave power to raise additional capital in the shape of debenture stock, with provision for a sinking fund for its redemption. The last Act, of the year 1892, was very similar, and again authorized the issue of further debenture stock, but no more shares. The plaintiff, as he had said, held £2500 of the 7 per cent. ordinary stock, and no other. The second defendant, Mr. Quincey, was the holder of £1500 of ordinary stock in the Company, which was not limited as to dividend, and was therefore entitled to 10 per cent.; and he held no other stock.

Mr. Justice JOYCE asked when the defendants' stock was created.

Mr. YOUNGER said he did not know; probably no one could tell.

Mr. CRIPPS said he represented the holders of the old stock.

Mr. YOUNGER then referred to the accounts of the Company for the half year ending June 30, 1901, which set forth the share capital authorized down to 1877, all lumped together, as £780,000. Then came the ordinary 7 per cent. capital under the Act of 1877, £160,000. There were two notes attached. Opposite capital stock, "(*a*) Originally issued as shares; converted into stock under authority of 8 Vict." "(*b*) Maximum dividend authorized, 10 per cent., *plus* the amount necessary to make up the deficiency of any previous dividend which shall have fallen short of the said 10 per cent." It also appeared that the amount applicable to dividends was £128,000.

Mr. Justice JOYCE asked if the public were not interested in this question.

Mr. YOUNGER said they were, in a sense; but they had a remedy in the way provided by the Water-Works Clauses Act.

Mr. CRIPPS said he thought their remedy, if any, would be under the Act of 1871—the Metropolis Water Act.

Mr. Justice JOYCE said he supposed the decision in this case would not affect the rights of the public in any way. He assumed there was more than enough profit to pay the 10 per cent.

Mr. YOUNGER said that was so. This was shown by a tabular statement exhibited to the affidavit of the Secretary of the Company. The question was whether this surplus was to be used in making up these so-called arrears, or go to the reserve fund. It was not until after this had been created that the rights of the public to have a reduction in the rates would arise. In 1810, the Company did not pay any dividend; but soon after that they paid 1 per cent., then 2 per cent., and gradually improved until 6 per cent. was reached in 1864. Since then it had been steadily increasing.

Mr. Justice JOYCE asked if the arrears of dividends, supposing the Company had a right to pay them, would belong to the present holders of the stock. Did the arrears pass by assignment?

Mr. YOUNGER said they did. There was in the Acts a form of transfer, which provided that all rights attaching to the share passed to the transferee. If any back-dividends were paid, they would be paid to present holders. The plaintiff's interest was this: He had received everything he was entitled to in respect of his 7 per cent stock, which was only created in 1877; and there were no arrears in respect of dividend. Accordingly, any sum which was now applied in paying arrears on the 10 per cent. stock would go to stockholders other than himself. He (Counsel) submitted in the first place, that *primâ facie* the Act of 1847 only applied to future companies, as was shown by the preamble, and that it only came into operation with regard to this Company in 1864, when it was incorporated on the amalgamation of the North Kent Company. He further submitted that no other construction was reasonable or just, or even workable. The construction for which his friend contended would alter the relative rights of the present shareholders *inter se*, and ultimately would affect the rights of the consuming public. The surplus profits would be divisible among the stockholders, not in proportion to the amount paid up, but to that amount *plus* something else dependent on the date when the stock was issued. The Act of 1864 was a statutory bargain made between the Company and the Legislature, for the benefit, among others, of the water consumers; and it could never have been the intention, when the bargain was made—the whole capital of the Company being then a little over £400,000—that more than £700,000, representing unpaid dividends for upwards of fifty years, was to be a charge upon the receipts before any reserve fund was created or any reduction made in the price of water. The learned Counsel concluded by citing a passage from a judgment of Lord Selborne, in *Metropolitan District Railway v. Sharpe* (5 App. Cases, 425), to the effect that, in construing Acts of Parliament of this kind, considerations of reason and justice ought to have much weight.

Mr. ASHWORTH JAMES having added a further argument to the same effect,

Mr. CRIPPS said the only question really was the interpretation of two or three sections of Acts of Parliament; and he must decline to follow his learned friend into an inquiry as to what was just, about which opinions might very well vary. In 1864, the Company were not limited either as to their charges or the amount they could pay in dividends; but by the Act of that year a maximum charge was introduced, and also a maximum dividend, subject to the condition that, in submitting to the limitation, the Company were entitled to the full amount, either in the past or the future. All these Acts applied *primâ facie* to the future. The Lands Clauses Act was incorporated *per se* in all future Acts; but the Water-Works Clauses Act required to be incorporated, otherwise it did not apply. The only section affecting the question was the 75th. After reading it, Counsel drew special attention to the words "unless a larger dividend be at any time necessary to make up the deficiency in any previous dividend which shall have fallen short of the said yearly rate." The Act spoke from the time it came into operation, and the words "previous dividends" could only refer to back dividends before the Act was incorporated. Supposing in 1864 they had made sufficient profit to pay 10 per cent., and had a surplus in hand, could they not have applied it to make up the amount of the dividends which had fallen short of the prescribed rate? It seemed to him that his friend's argument depended entirely on the fact that 1864 was a long time ago. But one had to consider whether it would be applied in 1864; and, if so, it must apply equally now. The only way in which it could be applied then was to the previous years, and these words could not be cut out of the section. The only other section which appeared to have any bearing on the matter was the 27th of the Company's Act of 1864; and this he submitted was decisive in his favour. It set forth that the several provisions in the Act, including the provisions of the Water-Works Clauses Act, 1847, should apply to "the whole undertaking of the Company." The word "undertaking" had been held in many cases to have the very widest meaning; but, according to the plaintiff's case, the Act was not to apply to the whole undertaking, but only to that part of it which came into being after that date—that it was not to apply to the capital raised up to that time. His friend had referred to difficulties which might arise in the distribution of the fund; but these were subsequent questions of detail which could not affect the principle. The only question at present was: Had the Directors a right to divide this fund? They had not yet got to the stage of how it was to be divided, though, as to this, he apprehended there would be no difficulty. If any stockholder thought he was unfairly treated, he could bring a complaint before the Court, It seemed to him that this was the whole case. He did not see that the consumers' rights entered into the matter at all.

Mr. Justice JOYCE, without calling for a reply, said it appeared to him that the question was simply one of construction. An Act of Parliament was passed in 1864 for the purpose of amalgamating the undertaking of the North Kent Water Company with that of the present Company, for the dissolution of the North Kent Company, for authorizing the West Kent Company to raise further moneys, and for other purposes. This Act contained a section which incorporated the Water-Works Clauses Act, 1847. Having read section 75 of this Act, he said he was of opinion that the words "the said yearly rate" meant the prescribed rate; and, at all events, he was of opinion that there was no such deficiency as was referred to in the clause, except from the period when there was a prescribed rate. It appeared to him that the contrary view would lead to strange, extraordinary, and irrational results. Mr. Cripps had said that the point of time at which the section was incorporated must be the point from which to consider the meaning of the word "previous;" but he could not agree with this view. The point of time referred to was that at which the Company had to dispose of the funds applicable to the payment of dividend, and to any previous time when there might have been a deficiency in the prescribed rate. He should therefore grant the injunction asked for. He supposed the Company would have paid the costs, whatever the result.

Mr. YOUNGER said they would. It was a friendly action, but not a collusive one.

Mr. CRIPPS said he did not know whether leave was necessary for an appeal.

His LORDSHIP said he thought not; but if it were, he should give it.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Friday, Feb. 20.

(*Before Mr. Justice* WRIGHT.)

In re an Arbitration between Gough and the Aspatria, Silloth, and District Water Board.

Sir RALPH LITTLER, K.C., and Mr. W. G. CLAY appeared for the claimant; Mr. BALFOUR BROWNE, K.C., and Mr. ROSKILL represented the Water Board.

Mr. BALFOUR BROWNE said this was a special case stated by the Arbitrator, raising two points for his Lordship's decision. The first was whether Miss Josephine Gough, who was a claimant under the Lands Clauses Act, was entitled to be paid anything for water, having regard to the words of the statute under which it was taken; the second, whether the Arbitrator was entitled to give her a certain sum because, as she claimed, there was a natural and peculiar adaptability in the site for a reservoir. He should submit, first, that Miss Gough had already been paid for water by the compensation clause in the Act; and, secondly, that there was no finding in the case which would justify the giving of anything to her for the special adaptability of the site. His contention before the Arbitrator was that there must be shown to be not only natural adaptability, but some market value by reason of it. The Water Board desired to construct a reservoir for the purpose of impounding water from the claimants' lake, and they had acquired land from her for the purpose. The lake was a feature in the landscape of her estate, which was in Cumberland, and so the Board had agreed to keep it intact, and to pay her compensation for the right to flood certain land which would still remain her property. The Arbitrator had awarded the claimant, subject to his Lordship's judgment, a total of £8974, which included £4700 for over-water and £1600 for special adaptability. This question of special adaptability was a very important one, because the principle was coming up every day in these compensation cases. The point was whether they were entitled to consider mere adaptability of a site, unless there was shown to be likely customers. Here the evidence had not shown any demand for a reservoir in this place, except by the appellants. No one else was at all likely to require the site for a reservoir. The questions on which the Arbitrator asked the opinion of the Court were these: First, whether, in estimating the value of the land and the easement to be acquired by the Board for the over-water of the Chapel House reservoir, the natural and peculiar adaptability for the construction of a reservoir on the land in question was or was not a fit and proper matter for consideration as an element in the value thereof in assessing compensation; secondly, whether, upon the true construction of the Act, and particularly of sections 24 and 30, the claimant was or was not precluded thereby from claiming compensation for water that might be collected, impounded, or diverted, under powers of that Act. He submitted that the claimant had no right to this compensation, because she only claimed as riparian owner.

Justice WRIGHT intimated that he need only trouble Sir R. Littler to reply to the point as to the £4700 for the water.

Sir R. LITTLER argued that the claimant was entitled to this compensation, because her property had been injuriously affected. The Water Board had taken enough water to supply 100,000 inhabitants a day, and had power to charge accordingly. Surely Miss Gough was entitled to something for this, because practically the Board acquired an absolute interest in the water.

Justice WRIGHT, in giving judgment, said he felt bound to hold that the Arbitrator had gone too far, and that the claimant was entitled to nothing more than compensation water. There could be no purchase of the water, and the Arbitrator had gone wrong in so far as he had included anything in the award in respect of such purchase. The award must go back to him to see how much, if anything, of the £4700 he gave for interference and other rights of a riparian character, or otherwise connected with the soil. With regard to the question of the special natural adaptability of the site for the purposes of water supply, he did not see his way to interfering with the award, as he thought it must be taken that there was a special value in such a site. He therefore answered the questions in the case accordingly.

Question as to Taking a Poll.

In the King's Bench Division of the High Court of Justice last Tuesday, before the Lord Chief Justice and Justices Ridley and Darling, Mr. Macmorran, K.C., on behalf of the Mayor of Dover, appeared to show cause against a rule calling upon him to take a poll of the owners and ratepayers of the borough, under the following circumstances: The Corporation had entered into an agreement, which was to be confirmed by Parliament, to supply electricity within the town, subject to the condition that they were not to do so until they had bought up the

undertaking of the Electric Light Company at Dover. A Bill was promoted for the purpose of enabling the Corporation to raise money to effect the purchase; and the requisite resolutions under the Borough Funds Act were passed. It then became necessary to call a meeting of the owners and ratepayers to confirm or reject these resolutions. A meeting was held, at which the Mayor presided; and the resolutions were declared carried on a show of hands. A written demand for a poll was then made by a Mr. Bottle, and a Mr. Bradley rose to second it; but the Town Clerk said it was not necessary to do so, as a poll had been demanded, and the same would be taken. Mr. Bottle subsequently withdrew his demand; and the Mayor was advised by the Town Clerk that, this having been done, there was no power to hold it. The Mayor had no desire to shut out the ratepayers from a poll, and was perfectly willing to act as the Court should direct. Mr. Danckwerts, K.C., and Mr. Courthope Munroe, for Mr. Bradley, who obtained the rule, were not called upon. Their Lordships said they were clearly of opinion that the rule must be made absolute. All that was required under the Act was a demand for a poll—there was no necessity for its being in writing; and it was manifest that Mr. Bradley claimed a poll. It was by no means clear that a demand for a poll could at a later stage be withdrawn, and to so hold would give rise to considerable confusion.

Continental Incandescent Gas Company.

On Monday last week, Mr. Justice Darling and a Common Jury heard, in the King's Bench Division of the High Court of Justice, a case in which Mr. Ludwig Lehmann was plaintiff and Mr. Max Weinberger defendant. The question to be tried was whether, in August last, when the defendant put in an execution on the goods of the Continental Incandescent Gas Company, they were goods he was entitled to take under the debentures of the Company, who were the judgment debtors. Plaintiff was a mica merchant who did business with the Company, who dealt in gas mantles and fittings. The Company had considerable transactions with people abroad who required security; and Mr. Boehm, their General Manager, suggested that plaintiff should back their bills. He said he would do so on proper security being given; and he then joined the Board. On the 16th of April, 1901, the Directors resolved to ask Mr. Lehmann to accept bills of exchange for £1000; he being protected by the issue of debentures on approved security. Two months later, it was stated that the Welsbach Company had taken action against the Continental Incandescent Gas Company; and it was resolved to issue debentures for £2000 to plaintiff in consideration of bills of exchange handed by him to the Company. On Aug. 22, it appeared that the debentures had been issued, but that Lehmann refused them, as they had not been registered. These debentures were therefore cancelled, and fresh ones issued and registered. Most of the business of the Company was done after that through the bills backed by Lehmann; and he, through the debentures, obtained a first charge on the Company's property. The Company then got into difficulties, and Lehmann had to meet a number of bills amounting to £847, while he had accepted others to the extent of £2150. The defendant put in an execution on Aug. 25 last, and plaintiff claimed that, under the debentures, the goods seized were his property. The plaintiff was called, and stated that the bills outstanding were for goods supplied to the Company. In cross-examination, he said he supposed the goods were all sold. The Company was one formed to take over the business of a man named Boehm, who had infringed the Welsbach mantle patent. There was an injunction out against them, and this was why he resigned. The Company had 5000 shares, and of these Boehm and his wife took 2865, witness 51, and other people 91. At the meetings of the Company, witness and Boehm were the only Directors present, as the others had resigned. Witness did not pay for his 51 shares in the Company, nor did Mr. or Mrs. Boehm pay for theirs. The Company had not much capital, in cash, but they had a very large stock. The questions left to the Jury were whether the debentures by virtue of which the plaintiff claimed, were issued to him in good faith as security for the acceptances given and to be given by him for the goods supplied to the Company, or was the whole arrangement a fraud arranged between plaintiff and Boehm. The Jury found for the defendant, and judgment was given accordingly; but a stay of execution was granted.

Disputed Liability for Water-Rate.

At the Westminster County Court on Friday, the case of *Grand Junction Water-Works Company v. Blight* came before his Honour Judge Woodfall. It was an adjourned action, in which the plaintiffs sought to recover ten quarters' water-rate from the owner of five houses at Isleworth. Mr. Bartley appeared for the plaintiffs; Mr. I. Landau represented the defendant. Mr. Bartley said the case was before the Court in November last, when the defendant disputed the assessment, which was £18; and the matter had to be adjourned for bringing the question before two Justices. This had been done, and they assessed the property at £18 10s. He therefore asked that the claim might be amended to one for £9 9s. 3d. instead of £8 15s., to cover the increased assessment. His Honour allowed the amendment. Mr. Bartley then went on to say that the last water-rate paid was the one up to March, 1900; and it was collected from defendant's tenants. Facts came to light which necessitated an alteration, and the Company acted upon their rule of looking to the owner of the property to pay the rate. He was informed of their determination, and the collector made the demands in the usual way; but the defendant had not paid. The collector gave evidence in support of these statements, and in cross-examination said the Company could assess the tenant. Mr. Landau contended that under the Water-Works Clauses Act, 1847, any dispute had to be settled by the Justices, and that therefore this action was premature. Here was a *bonâ fide* dispute, and the Justices must decide what the annual value was before the Company could bring a civil action. Mr. Bartley said the dispute must be a *bonâ fide* one as to the annual value of the property; and defendant's letters showed that this was not the point at issue, which was that the Company had formerly collected the water-rate from the tenants, and that they ought to continue to do so, as the tenants agreed to pay all rates, &c. Defendant really said to the Company: "You cannot cut off the water because I am liable;" and when he was sued, he disputed the assessment. The action was brought before that was disputed. His Honour asked how the value was fixed. Mr. Bartley said, the premises being outside the Metropolis, the Company were not bound by the annual value, and they fixed it on the rent, after making deductions for repairs, &c. Mr. Landau said the defendant did not admit the Company's valuation, and went before the Justices, who decided against him. How could the Company sue before the Justices had fixed the amount? He submitted that the action was premature. His Honour said he must decide against him. There was no dispute as to the assessment prior to this action; and therefore there must be judgment for the plaintiffs, with costs.

Damages for Injury by Gas Poisoning.

At the Wolverhampton County Court last Friday, his Honour Judge W. Howland Roberts completed the hearing of an action brought by Mrs. Eliza Griffiths, 75 years of age, to recover from the Wolverhampton Gas Company £50 damages for injury sustained by gas poisoning by reason of the Company's neglect. On Nov. 16, the plaintiff and her husband were found by neighbours lying in their house in an unconscious state, caused, as alleged, by an escape of gas from a broken main, from the effects of which the husband died, and plaintiff was seriously ill for some weeks after. For the Company, it was not denied that the gas-main was cracked or broken; but this was said to be due to the fact that two steam-rollers belonging to the Corporation—one weighing 10 tons and the other 15 tons—had been operating in the street. Since the gas-main was laid in 1877, excavations had been made by the Corporation for the purpose of laying a storm-pipe; and on examining this particular spot after the accident, it was found that the soil immediately below the gas-main, just at the point of fracture, had sunk considerably, leaving the main partially unsupported. The inference was that this was the result of the later excavations; and that then the operations of these two heavy steam-rollers caused the main to sink down at the particular point, and so caused the displacement of the packing round the main, and the fracture of the main itself. The Company had no knowledge of this. They had received no complaints of gas escaping from the main until after the unfortunate occurrence to the plaintiff and her husband, and therefore they could not be charged with negligence. Evidence bearing out this view of the case was given by the General Manager of the Company (Mr. P. G. Winstanley) and other witnesses; while for the plaintiff it was contended that the main was not in the first instance either properly laid or properly packed. The evidence showed that the day before the accident, an employee of the Company was at work in the street in which Mrs. Griffiths lived; and she went to him and complained of a strong smell of gas in her house. The man, however, did not report the matter at headquarters. His Honour, in giving judgment, said it was abundantly clear from the evidence on both sides that the immediate cause of the fracture of the main was the operation of the heavy steam-roller on two or three days just before the accident, and the condition of the loose soil in which the main was laid. The next point was: Had there been any negligence on the part of the Company in the original laying of the main, or in regard to their system of periodical inspection and examination afterwards. On this, he held that there was negligence on the part of one of the Company's servants in not at once reporting to his superiors on the afternoon of the day preceding the accident the leakage of gas brought to his knowledge by Mrs. Griffiths. He therefore gave judgment for the plaintiff, with £40 damages and costs.

The Gas Compressors at the Glasgow Exhibition.

The trial of the action for breach of contract brought by the James Keith and Blackman Company, Limited, against (1) the Corporation of Glasgow and (2) the Incorporated Glasgow International Exhibition Association, 1901, and the Liquidator (see "JOURNAL" for Nov. 11 last, p. 1286), and which was set down for hearing before Lord Low in the Court of Session, Edinburgh, on the 29th and 30th ult., was, within a week or so of the dates mentioned, and owing to the illness of the Judge, again postponed until May. Meanwhile, so far as the main case is concerned—*i.e.*, the action against the Corporation of Glasgow for the price of the two large Keith duplex automatic gas-compressors which so successfully supplied the intensified gas for the lighting of the grounds of the Glasgow Exhibition—we understand that, as the result of a conference, a settlement has been arrived at. Under the agreement come to, the case has been taken out of Court in terms of a joint minute, under which the defenders have been assoilzed, no expenses being found due to or by either party. The settlement is that the Corporation agree to take over the two large gas-compressors for use in Glasgow, and to pay the sum of £400 for them—the price quoted to Mr. W. Foulis, the Gas Manager and Engineer of the Corporation, by Mr. James Keith at the close of the exhibition. In addition to this, the Corporation will pay the sum of £50, which the Company have agreed to accept in full discharge of the expenses incurred by them.

Slot Meters and the Bronze Currency.—At a meeting of the North Staffordshire Traders' Association, held at Hanley on Wednesday, a discussion took place with respect to the scarcity of coppers in the district. Mr. W. H. Shaw (the Secretary) remarked that the complaint was general, and that the slot meters of the gas companies appeared to be responsible. All the copper was locked up in these meters, which were opened only periodically. Mr. J. Mavor (Hanley) said the Gas Company confessed that there was something like £2000 a month locked up in their meters. The banks took no steps to remedy the matter, because they said that after the 19th of the month there was a flood of coppers. It was decided to write to the various local banks, requesting them to get a better supply of coppers so as to meet the demands of the district.

MISCELLANEOUS NEWS.

COMMERCIAL GAS COMPANY.

The Ordinary Half-Yearly Meeting of the Proprietors of this Company was held on Thursday last, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW in the chair.

The SECRETARY (Mr. H. D. Ellis) read the notice convening the meeting.

The Chairman, in affixing the seal to the register of proprietors, remarked that it might interest those present to know that the number of holders of ordinary stock was now 1650, and of debenture stock 1100.

The report and accounts having been taken as read,

The CHAIRMAN moved—"That the report and accounts be received, adopted, and entered on the minutes." He said: Gentlemen, the accounts which we present for your approval to-day show the largest balance of profit in the history of the Company. The balance on revenue account for the half year amounts to £64,572; and this is £13,640 in excess of the balance of profit at this time last year, when it was £50,932. The interest on the debenture stock and on temporary loans, after crediting the interest on the investments, amounts to £6710; and deducting this from the gross profit leaves £57,862 as the net profit for the half year. Adding to this the balance of profit brought forward from the previous half year (£4525), we have a balance available for dividend of £62,388, which is £17,804 better than for the corresponding period of last year. I am happy to say the figures are really even better than they appear to be on the surface, for the revenue account contains this half year two debits, one of which has not appeared there before, and the other is much larger than usual. The first is an item of £1758 on account of profit-sharing. Although the bonus is not declared until the 1st of July, we thought it preferable to spread the cost over the whole year rather than charge it all to the June half. Then there is the item of £1544 for law and parliamentary charges, whereas the average charge under this head only amounts to something under £400. So that the profit is really £2800 better than it appears to be—that is to say, we are better this half year by £16,440 than at this time last year. You will see from this that we are in a position to pay the full statutory dividend. But, as you know, the Company are entering this half year upon altered conditions of working under our Act of last session; and the Directors are very anxious to begin again to build up the reserves, which have been considerably depleted since the phenomenal rise in the price of coal took place. Therefore the Directors recommend a dividend of 12½ per cent. on the old stock and 9½ per cent. on the new stock, which is ½ per cent. better than this time last year. Then we propose to carry the difference between the authorized rate of dividend and the declared rate to the reserve fund. This will amount to ¾ per cent., or £6013 for the year. Now the improvement in the earnings is due mainly to the saving on coal and oil, on which we spent in the half year £85,554, as compared with £99,189 in the corresponding half of 1901. This is a saving of £13,635. Then, on the other side of the account, the gas sales and meter and stove rental show an improvement of £2513. The receipts from residual products are better by £2241, which is due to the improved price of tar. Besides, we have also saved on the cost of manufacture £1461; and this is due principally to a decrease in the carbonizing wages. These various items represent a total saving of £19,850, against which has to be set an increased expenditure. On distribution, the increase is £2021, chiefly due to stoves and coin meters, which is a very satisfactory item to be increased. The other increases are: Management, £554; discounts, £499; and parliamentary charges, £1043. These, with other small items and the sum set aside for profit-sharing, to which I have already alluded, amounts to a total increased expenditure of £6210. Deducting this from the saving of £19,850 leaves a net increase of profit amounting to £13,640. After paying our dividend, and transferring £6013 to the reserve, we shall be able to carry forward £9936 to the credit of next half year. This is a larger sum than we have been able to carry forward for a great many half years. I think I have said all that need be said about the revenue account; and I have no doubt that you will regard the result of the half year as very satisfactory and as indicating a return to the more prosperous times which we enjoyed before the great rise in the cost of coal necessitated an increase in the price of gas, and a diminution in the rate of dividend. I want to take this opportunity of thanking you for the cheerful support you gave the Board when we thought it right to ask you to forego a portion of the dividend to which you were legally entitled, in order to ease the burden on the consumers of the increased price of gas. I think your self-denial has borne good fruit, in that it has satisfied the consumers that the Company are making every effort to supply them with cheap gas, and in convincing them that their interests are considered in every possible way. Moreover, except in the case of the street lighting (which is under the absolute control of the public authorities), we have succeeded in overcoming the competition of the borough electric lighting schemes and in preserving our business, in spite of the many inducements which have been held out to our customers to take the more expensive light. I think your patience in this matter of dividends is now in a fair way of being rewarded by a return to the higher dividends to which you have been so long accustomed. At any rate, I may say that the position of the Company was never more sound, nor the outlook more encouraging, than it is to-day. Now, I wish to turn for a moment or two to the capital account. The first item is the expenditure on the new steamship—£8122. I am happy to be able to tell you that this new steamer has been running now for some months very satisfactorily. In fact, she has made the passage up the tortuous River Lea, and under the low bridges of that river, so successfully, that we are considering the question of building a larger steamer, which can be run more economically. At the last meeting, I explained that hitherto we have had to unload the coals intended for our Poplar station (which is our largest station) in the River Thames, and to barge them up the Lea. By running these special steamers, we save the cost of unloading, the cost of barge hire, and, as we own the steamer, a considerable economy is effected by saving the profit of the shipowner from whom we have hired our ships. It is too early to say exactly what the total saving will be; but we have had sufficient experience and have saved enough to satisfy us that our policy in this respect is the right one. I am sorry to have to add that a fortnight ago the "*Commercial*," for so we named the first ship belonging to the Company, was in collision in one of the lower reaches of the Thames, by which she was considerably damaged, and had to run ashore. However, she is fully insured, and as we could do without her easily at the present time—coals having come in plentifully—the Company will not sustain any loss; and in a week or two she will be running again. There are two other items on the capital account which call for comment. The first one is stoves, £3435, which represents an increase of £1618 over the amount spent in this way in the corresponding half of last year. The stoves on the district now number over 17,000, and the number of consumers is 43,249; so that about 40 per cent. of them have stoves, either for cooking or heating purposes. I should like to see this proportion very much increased, and shall not be satisfied until we get to 80 or 90 per cent. I hope this may be so. At all events, we shall do everything we can to push the adoption of stoves. Of the 43,249 consumers, 24,708 have ordinary meters, and 18,541 have coin meters. In the year, there has been an increase of 464 ordinary consumers, and 3375 in the coin meter consumers, which is a total gain of 3839 customers. This is a very satisfactory figure. We are now fixing coin meters far more rapidly than formerly; the sum charged to capital this half year being £7844, as compared with £3196 in the corresponding half of 1901, and representing an increase in the six months of 2601 coin meter consumers. You will see the importance of this branch of the business when I tell you that the sale of gas by means of these coin meters gave us an increase of 20½ million cubic feet of gas in the half year, while the total increase over the whole business was only 10 millions. So that, if it had not been for the coin meters, instead of having an increase of 10 millions, we should have had a decreased sale of 10½ millions. The figures I have given you relating to the number of consumers will show that the small increase in the sale of gas was not due to any loss of business, but simply to climatic and other reasons beyond our control. The South Metropolitan Company had an increase in their sale of gas of 2½ per cent., and the Gaslight and Coke Company a decrease of nearly a ½ per cent. Our increase of 10 millions represents a gain of ¾ per cent.; so that proprietors will see the Companies were all very much in the same boat in this respect. The total capital now expended amounts to £1,154,457, and represents £426 per million cubic feet of gas sold, which is a low figure. It would be a good deal lower still if it were not for the extra amount we have spent recently on stoves and coin meters (which have not yet had time to become remunerative) and the very small increase in the sale of gas. I think I have now said all that I need say about the accounts. I now come to the paragraph in the report which relates to the promotion of a Bill in Parliament in the present session. This Bill will be submitted for your approval and sanction at the special meeting to be held immediately after the conclusion of this one; but I think it will be convenient if I explain the circumstances which have rendered it necessary to promote this Bill, in order that you may have the whole position of the Company before you at once. The question will probably arise in your minds, "How is it you want to go to Parliament again so soon after obtaining your Act of last year?" and I will give you as clear an explanation of the position as I can. It is a very technical matter, and rather difficult to explain. But I will begin at the beginning. You are doubtless aware that up to the 31st of December last, the Company were under the obligation to supply gas of an illuminating power equal to the light of 16 sperm candles of the weight and composition specified in our Act of 1875. It does not affect the question that the standard has been altered from candles to the pentane lamp; for it may be taken that the standard remains practically the same. By the City of London Gas Act, 1868, it was enacted that the Gas Referees (who were to be appointed under that Act by the Board of Trade) were to prescribe the burner which was to be used for testing gas, and that burner was to be "such as shall be the most suitable for obtaining from the gas the greatest amount of light, and be practicable for use by the consumer." I particularly want the proprietors to take hold of these words. The Act of 1868 only applied to the three Companies who were then supplying the City of London. But the testing clauses in the Act became the model for all the Metropolitan Companies; and, consequently, in 1875 they were re-enacted, word for word, in our Act, with one exception which I will explain. It was this: In the seven years which had elapsed between 1868 and 1875 a burner had been made which exactly complied with the two conditions laid down in the Act of 1868—it was "suitable for obtaining from the gas the greatest amount of light" when the gas was burnt in it at the fixed rate of 5 cubic feet per hour; and "it was practicable for use by the consumers." This burner had been made the standard burner, and was known as Sugg's "London" argand burner. Therefore, the framers of our Act of 1875, instead of leaving it to the Gas Referees to prescribe a burner which should be most suitable for obtaining from the gas the greatest amount of light, and be practicable for use by the consumer, rightly inserted two clauses—one prescribing Sugg's "London" argand burner as the burner with which the gas was to be tested, and another enacting that the gas should be burnt in it at the rate of 5 cubic feet per hour. Thus the desired object was attained; and up to the end of last year our gas continued to be tested in this way, and with this burner, with perfectly satisfactory results. But from the end of last year, we have had to supply gas not of 16 candle but of 14-candle power. Now, if you have these facts in your mind, I want to make a little digression. The chief factor in "obtaining from gas the greatest amount of light" is that the supply of air to the flame shall be sufficient, but not excessive. If, on the one hand, too little air is supplied to the

flame, some of the constituent parts of the gas remain unburnt, and part of the illuminating power is lost. If, on the other hand, too much air is given to the flame, the carbon in the gas, which gives the light as it becomes incandescent, is consumed too quickly, and in that way too the illuminating power is diminished. Now Sugg's "London" argand burner—the standard burner—gives exactly the right amount of air to 16-candle gas burnt at the rate of 5 cubic feet an hour; but it gives too much air to gas of a lower illuminating power burnt at the same rate, and consequently it makes a lower grade gas appear less rich in light-giving properties than it actually is. Moreover, as the poorer the gas the less air it requires, it follows that the gas is robbed of its illuminating power in a greater degree as the quality is diminished. I think I can make this clear by giving some results published by Professor Vivian Lewes in his recent Cantor lectures at the Society of Arts. He finds that if 16-candle gas is burnt at the rate of 5 cubic feet an hour in Sugg's "London" argand burner, it gives the light of 16 candles, because it has the right amount of air; but 15½-candle gas, if consumed in the same burner and at the same rate, gives only a light of approximately 15⅝ candles—a loss of $\frac{1}{10}$ candle. When he comes to 15-candle gas, he found there was a greater loss; it would only give a light of approximately 13⅝ candles. When he tested 14½-candle gas, there was a still greater loss; the light being of only about 12⅛ candles. Then 14-candle gas gave a light of only 11⅛ candles. The reason for this is that the lower qualities of gas are adulterated with an excess of air, which excess becomes greater as the illuminating value of the gas is diminished. In other words, the admixture of air poisons the gas. You can carry these experiments still further. You can take a burner, and make the supply of air so great that eventually you would arrive at a pitch where the gas gave only a blue flame, and no light at all—as in the case of a bunsen burner, or the burners which are used for some sorts of gas-stoves. Now this injustice to the gas of a lower quality than 16 candles can be overcome quite easily, and in two different ways. One way is to use a burner which admits only the proper quantity of air. Such a burner is in existence, and is known as the "Brentford" or "Wandsworth" burner, because it is used, by the authority of Parliament, in testing the 14-candle gas supplied by the Brentford and Wandsworth and Putney Gas Companies. Another way is to use Sugg's London argand burner, and to compensate for the excess of air by burning the gas supplied to it at a faster rate than 5 cubic feet per hour. In this way, the proper admixture of gas and air is made; and then, in the words of the City of London Gas Act, 1868, "the greatest amount of light is obtained." A very simple calculation, founded on the rate at which the gas is consumed, suffices to indicate the quality of the gas. The Bill which we submit for your approval to-day provides that our 14-candle gas shall be tested in this way. I may say that this same provision was included in the Company's Bill of last session; but it was struck out on the representation of the London County Council witnesses that the Gas Referees could, and would, prescribe that the gas should be fairly tested. We had reason to believe that they would do so because the Gas Referees themselves had previously recognized the unfairness of giving an excess supply of air to the gas; for when the photometer was altered some three or four years ago, they prescribed that, when the quality of the gas was below 16 candles, a larger quantity of gas should be used in testing to compensate for the excess of air. But in the notification issued by the Gas Referees last November, which prescribed the mode of testing the 14-candle gas to be supplied by this Company, they, to our surprise, prescribed that it should be burnt at the rate of 5 cubic feet per hour, involving the admixture of an excess of air, as I have described, and thus robbing it of a large part of its illuminating power. It is only right to say that the Gas Referees, when we remonstrated with them, stated that they felt themselves bound, by our Act of Parliament, to prescribe the method of testing they have ordered. How they could say this when they had already departed from it, I do not know; but it is only fair to state that that was the ground they took. Now the bargain we made last year with Parliament was that, in consideration of the Company giving up 2d. from the initial price, we should be allowed to supply 14-candle gas instead of 16. But the action of the Referees has broken that arrangement, and forced us to manufacture gas, and we are actually supplying it at the present moment at least 1 candle higher than the 14 candles enacted by Parliament. You are aware that what the public require at the present time is a cheap gas of a low illuminating power, and the effect of the notification of the Gas Referees is simply this, that we are forced to give to the public an article they do not want, and, of course, at an increased cost. As the effect of the sliding-scale is to throw five-sixths of the extra cost on the consumer, you will follow me when I say that it is as much in the interests of our consumers as in the interests of the proprietors that we ask you to approve of the Bill to-day, in which we propose to appeal to Parliament to give us what it was intended we should have last year—that is, the right to supply gas of an illuminating power of 14 candles. I have only this to add that Parliament has already passed similar legislation in the case of the South Metropolitan, the Crystal Palace, the West Ham, the Wandsworth, the Brentford, and other gas companies, so that we may look forward with confidence to the passing of the Bill. I am afraid, gentlemen, I have bored you with this long explanation; but we are anxious you should have before you the exact position of the Company, and the reasons which dictate the policy of the Directors. The Company belongs to the shareholders; and it is right you should know exactly what is going forward. I hope the explanation I have given is sufficiently clear to convince you as to the necessity of making this fresh application to Parliament. We have reduced the price of gas from 2s. 8d. to 2s. 6d. per 1000 cubic feet, because, although the bargain we made with Parliament has not been kept with us, we felt it was our duty to fulfil our side of the contract, and to give the consumers the full reduction in price represented by the diminution of the illuminating power. As you are also aware, a reduction of price does stimulate the sale of gas; so that, from any point of view, our policy in reducing the price was right. We are enabled to do this because we have had a prosperous half year, and we are justified in doing it because we have no reason to doubt that our application to Parliament will result in the injustice to which we have been subjected being set right. Another paragraph in the report relates to Mr. Jones; but I will reserve my remarks on that matter until I move the resolution referring to it. I have now only to congratulate you on the prosperity of the Company; and if you will allow me to say so, in my opinion, the outlook was never more promising than it is at the present time.

The DEPUTY-CHAIRMAN (Mr. Walter Hunter) seconded the motion.

The CHAIRMAN, replying to a question, said the collision of the Company's steamer would occasion them no loss from compensation. They were fully insured against damage caused to, or by, the ship; and moreover, as it happened, they would suffer no inconvenience.

The motion was unanimously agreed to.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, a resolution was passed declaring a dividend at the rate of 5 per cent. per annum on the 4 per cent. stock and 4¾ per cent. per annum on the 3½ per cent. stock, less income-tax, and transferring to the reserve fund the difference between the declared dividend and the authorized divisible amount, having regard to the price charged for gas during the year.

A Retiring Allowance for Mr. Jones—Reminiscences of Metropolitan Gas Management.

The CHAIRMAN said he now came to the resolution which he foreshadowed at the last meeting he should move on this occasion. It was—"That, in consideration of the valuable services of Mr. Harry Edward Jones, a retiring allowance of £1200 for life be granted to him, such allowance to commence as from Jan. 1, 1903." It gave him (the Chairman) great pleasure to move this resolution, and the pleasure was not tempered with the regret which would otherwise be the case, because, as he had before told the proprietors, their good friend and able Engineer was not going to leave the Company, but would occupy a seat on the Board. He need not remind the proprietors of the valuable services Mr. Jones had rendered to the Company during the 34 years in which he had been connected with the concern. Thirty-four years was a very big slice out of any man's life; and he knew the proprietors would agree with him that Mr. Jones had given the very best years and the very best efforts of his life to the Company. He had steered their ship through many difficulties; and he (the Chairman) thought he might say had brought it into the haven of prosperity. He succeeded in giving satisfaction to his Directors; and he was sure that he had satisfied the proprietors. He had satisfied the staff, and he had satisfied the consumers. More than that, no man could do. It was only natural that he should desire now to be relieved from the vast amount of detail which the management of a Company like theirs entailed; and their good wishes would follow him into his comparative retirement. It would interest the proprietors if he (the Chairman) gave them some figures as to the growth of the Company since the time Mr. Jones took the engineership and management in 1880—23 years ago. At that time the consumers numbered 20,000; they now numbered 43,000. The quantity of gas sold in 1880 was 1428 million cubic feet; it was now 2708 millions—nearly double. The capital expenditure was then £674,000; it was now £1,154,000—that was £480,000 more. Then the capital amounted to £472 per million cubic feet of gas sold; Mr. Jones had brought it down to £420 per million cubic feet. The price of gas was then 3s. 3d. per 1000 cubic feet; to-day it was 2s. 6d. The dividend was then 11½ per cent.; it was now 12½ per cent., and had been 13¾ per cent. Mr. Jones's father was with them for 26 years; and the amount of retiring allowance proposed for the son was the same as in the case of the father, though the son had given them so many more years' service. He (the Chairman) was quite sure of this, that the proprietors would like to show their appreciation of the services Mr. Jones had rendered to the Company by giving a hearty and unanimous vote in favour of this resolution.

The DEPUTY CHAIRMAN observed that he had much pleasure in seconding the motion. No one could have given the Company better service than Mr. Jones had done. When he reminded the proprietors that the district had given little scope for expansion for a good many years, except by means of new methods (such as coin meters and stoves, which had lately developed so largely); that Mr. Jones had earned good dividends upon dear capital (that was, capital issued without the auction clauses); that even now the Company had, at any rate, one of the lowest capitals per million cubic feet of gas sold of any similar undertaking in the Metropolis or elsewhere; and that the results he had achieved chemically were highly favourable compared with other undertakings—it would be seen what good work he had done for them. He had maintained their dividend, and, in fact, it had been increased under his management. Under the circumstances, he (Mr. Hunter) was satisfied that the proprietors would carry the resolution unanimously.

Mr. ENNIS said he did not think a motion of this kind should be allowed to pass without some expression of opinion from the proprietors' side of the table. He had known Mr. Jones for a good many years—not personally, but as the able Engineer of the Company. He was sure the proprietors would agree that Mr. Jones was entitled to the very best allowance the Directors could make him. He took it that they had given him the best allowance they could recommend to the proprietors; and if it had been larger, he (Mr. Ennis) would have been disposed to have supported it. And this was in spite of the fact that he had occasionally differed from Mr. Jones and the gentlemen on the other side of the table; but that had always been without any malice whatever. He thought Mr. Jones's long services fully entitled him to the sum named; and, further, he should like the resolution to be conveyed to him with an expression of the proprietors' thanks for his very long service in the capacity of chief dividend maker in the Company. He had brought them through very difficult periods. The chief difficulty to his (Mr. Ennis's) mind, was the fact that he had had to produce dividends on a very extravagant capital—that was, a capital bearing a large dividend. The condition of things was more moderate now. He and the Directors had brought them to a period when the premium capital had been consolidated into a capital stock, which was a better measure of its value on the market. For all these things, they were indebted partly to Mr. Jones's able advice to the Board, and partly to the Board for adopting them.

The CHAIRMAN observed that, if it would meet with the wishes of the proprietors, he would add to the resolution, "and that the best thanks of the proprietors be given to Mr. Jones for his long and valuable services."

The proprietors concurred; and the resolution in its extended form was carried unanimously.

Mr. JONES, in the course of his acknowledgment, remarked that he was afraid he had often bored the proprietors on matters which he thought might interest them. Words were failing him that day, because, although there was a saying "that out of the fulness of the heart, the mouth speaketh," it was not always so when the heart was very deeply touched. He thanked Mr. Ennis for the very generous terms in which he had spoken of him. It was no light thing to give up the active administration of a great undertaking like this; and, if time permitted, he should like to tell the proprietors what that meant to anyone whose heart was really in his work, as his had always been. The problems that surrounded the administration of a great undertaking supplying a large public want in any way, and in any position, among any population, had its charms and interest. In their own case, the population was of the poorest—mostly industrial, and a population that had so changed in the course of his experience that now it was one almost of a foreign denomination. If they walked with him in their district, they would see the names over the shop-fronts speaking of Germans and aliens of every European nationality. One of the problems with which they had been faced was to discriminate, under these circumstances, what was the line on which the business of the Company could be worked and developed most successfully. He had seen a great sugar industry go away; and he had seen the most important dock business go down the river. The class of people who would use gas-stoves for cooking had largely disappeared; and the habits of life among the alien part of the population did not include much cooking. Since 1869, he had seen many other important changes. He had seen the uprise of electricity twice used to knock the proprietors' stocks down in the market. But there was never a better outlook for the proprietors than there was now. Electricity came and invaded their lighting. Against the Welsbach mantle that had failed. Then as a power, electricity was not a power in itself. It was only a means of communicating power. If they wanted power, they must go to coal and burn it on the bars of a steam-boiler, or they must go to gas and burn it in the cylinder of a gas-engine. The proprietors would be gratified to learn that all through their industrial district, and on the margin of the river, where there were large users of power, the Company's gas was being introduced by means of gas-engines to take the place of steam. Many railway carriages, too, were lighted by gas, which was not thought of when he joined the Company's service; and the time would come when these carriages would be propelled by gas. Dr. Mond had brought out a process of making gas, to perform all operations of an industrial character. That was a cheaper gas than the Company's; but the Company's gas was the better of the two. So long as the Company's gas could be made at six times the price of Dr. Mond's, it was considerably better. All these things were of great interest. The proprietors might say, "Then, why do you leave them?" The answer was, because he had had 34 years of Metropolitan gas management. Sir George Livesey and another gentleman in the room—Mr. Charles Carpenter, of the South Metropolitan Gas Company—could tell them it was no joke to be a Metropolitan gas manager. No Sunday of his (Mr. Jones's) long record had passed without a telegram from the works. He lived in the country, and that telegram often spoilt his breakfast and his church service too. When his thoughts should be on better things, they would be upon the question of how he could evade the Police Court penalty that was dogging his steps. He was connected with different Companies—one in India, one in Brazil, and several in Europe; and he knew of no such system as this Metropolitan gas system. When his son was considering the taking up of his present position in the Company's administration, he (Mr. Jones) said to him: "If you want peace and comfort, you will not find it in London; you must go to a provincial gas undertaking." He was glad it was the intention of the proprietors to make him (the speaker) a Director. To divorce him altogether from the carrying on of the Commercial Gas Company would be practically to take away the interest from his life. He had made long journeys, and had travelled night and day—always because he wanted to get to Stepney. Stepney was always in his heart. Except once when he went to America, he had never been away from his office for three weeks at a time, and seldom for more than forty-eight hours. He had loved his work; and he was deeply grateful in having the opportunity, as he should have, of rendering to the Board any advantage that his service might be to the Company. They had a young and energetic staff (to use a common expression) "as keen as mustard." One of the greatest tributes that they could possibly have was paid to them the other day. His son, who lived in the district, came across a member of one of the Borough Councils, who said that their Electrical Engineer had only told them that day that it was difficult to make any headway against such an up-to-date Company as the Commercial Gas Company. (Applause.)

Re-Elections and a New Appointment.

On the motion of the DEPUTY-CHAIRMAN, seconded by Mr. JOHN GOULD, Messrs. W. G. Bradshaw, T. Bevan, and F. Green were re-elected Directors of the Company. Proposed by Mr. ARTHUR HARSTON, and seconded by Mr. GOULD, one of the retiring Auditors (Mr. R. Y. Bevan) was also re-elected.

The CHAIRMAN remarked that the next business was the appointment of an Auditor in place of Mr. J. Haigh. He should not like that gentlemen to break his connection with the Company without saying a word in recognition of the long and valuable services he had rendered. He had been an Auditor since 1884, and had always done his work to the entire satisfaction of his fellow Auditors and of the proprietors. He (the Chairman) regretted very much that advancing years had induced him to give up the position. They had only received one notice of the intention of a proprietor to offer himself for the vacancy, and that was from Mr. G. W. Ilsley. He (the Chairman) knew him as the son of his father, who was a most efficient Auditor of the Company for, he believed, over thirty years, and he ceased to serve them in 1889.

Mr. BADDELEY, having referred in complimentary terms to the Chairman's able "16-candle" speech, heartily commended, from his personal knowledge of Mr. Ilsley, that gentleman to the vacant auditorship. He also mentioned the interesting fact that he had the pleasure of moving the election of the present candidate's father to the same position; and he had no doubt Mr. Ilsley would be a worthy successor to his worthy father.

Mr. ENNIS seconded the motion, which was carried unanimously.

Mr. HARSTON made a little speech, congratulating Mr. Stanley H. Jones on his appointment to the chief engineership of the Company. The speaker was peculiarly qualified to do this, as he had known Mr. Jones's grandfather—Mr. Robert Jones, who preceded in the position Mr. H. E. Jones.

The CHAIRMAN remarked that the Directors heartily agreed with what Mr. Harston had said regarding Mr. Stanley Jones, in whom they had the greatest confidence.

The New Bill.

The meeting was then resolved into a special one; and

The CHAIRMAN said the only business was the passing, if thought fit, of a resolution approving of the Bill that had been introduced into Parliament. The Bill only contained one important clause; and it was this:

> The burner for testing gas supplied by the Company shall be Sugg's "London" argand as prescribed by section 34 of the Act of 1875, and in making such testing shall be so used that the gas shall, notwithstanding anything contained in section 52 of the Act of 1875, be burnt at such a rate as shall give a light equal to 16 candles. The said burner shall be used with the chimney prescribed by the Gas Referees for gas of an illuminating power of 14 candles.

He believed the proprietors understood all about that now [laughter], so that he need not give them any further explanation. He formally moved the necessary resolution.

The DEPUTY-CHAIRMAN seconded the motion, which was unanimously agreed to.

The Chairman and Directors were heartily thanked for their conduct of the business of the Company; and a similar compliment was paid to the Secretary, the Engineer, their respective staffs, and the employees generally.

Mr. ELLIS, in responding, referred to two or three curious incidents arising out of the conversion of the stock. He also mentioned that the proprietors had now an official quotation for the whole of their issued stocks; and that the quotation for the new converted stocks was higher in proportion than the quotation for the old unconverted stocks. This showed that the Directors were justified in the forecast they made some time ago that the quotation of the converted stock would be to the proprietors' advantage.

Mr. STANLEY JONES made his first appearance as the Chief Engineer of the Company in responding for himself and his staff. He observed that he hoped the results of the next few years would justify his appointment; and he trusted that the Directors would never have reason to regret the confidence they had reposed in him.

This concluded the long but interesting proceedings.

LIVERPOOL UNITED GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held at the Offices, Duke Street, Liverpool, last Tuesday—Sir EDWARD LAWRENCE in the chair.

The SECRETARY (Mr. P. F. Garnett) having read the report of the Directors,

The CHAIRMAN, in moving its adoption, said he was sure the shareholders would join with the Board in expressing deep regret at the loss of their late colleague, Mr. H. B. Gilmour, who always took great interest in the working of the Company, and who had ever been faithful in his endeavours to promote its welfbeing. Their meeting that day was purely formal, though by Act of Parliament they were bound to hold it. Really it seemed to him that it was quite a farce to call the shareholders together, not to receive accounts, but simply to declare a dividend, which might as easily be passed by the Board. He had nothing to tell the shareholders, except that everything was working satisfactorily, and the condition of their property was to-day as good as it ever had been. They had heard a good deal from gas companies about the diminution in the consumption of gas; but he was glad to tell them that, so far as they were concerned, the past twelve months had not given them any trouble in this direction, for the increase during the half year amounted practically to 2 per cent., which he thought was very satisfactory. Of course, they still had to face the competition of electric lighting; but inasmuch as at the close of the last year they were able to reduce the price of gas to 2s. 8d. per 1000 cubic feet, which was lower than ever it had been before, he did not think there was any cause for complaint on the part of the consumers, nor was there any fear that they were going to sustain from electric lighting such injury as would be serious to their proprietors. At the same time, there might be surprises in store; but they could only go on from year to year doing their best to discharge the duties entrusted to them in protecting their property, and providing the public with as cheap an illuminant as it was in their power to give. They would be very glad to see the price even lower than it was at present. Whether it would be possible, with the quality of gas they were obliged to produce, to reduce the price further, he could not say; but they would do their best to keep it down to the lowest possible limit, consistent with what was safe and prudent. Everything had gone on satisfactorily during the half year; and the officials had all discharged their duties in the most gratifying manner.

Mr. BATESON seconded the motion.

The report was adopted, and the statutory dividends for the six months were declared; the meeting closing with a vote of thanks to the Chairman and Directors.

TOTTENHAM AND EDMONTON GAS COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held on Saturday last, at the Chief Offices, 639, High Road, Tottenham—Mr. CORBET WOODALL in the chair.

The SECRETARY (Mr. James Randall) having read the notice convening the meeting, the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN said it was his pleasant duty to propose that the report and accounts be received and adopted. An account such as that laid before the proprietors on this occasion was like the good wine that needed no bush—it commended itself without many observations from the Chairman. The Company had, as the proprietors knew, gone through somewhat varying fortunes during the last two or three years. In the year 1900, the profit was £15,900; in 1901, £24,745; and in the year just closed (1902) it was £25,722. The increase in the sale of gas had, during the whole of that time, been satisfactory. It was worthy of notice that, while in the year 1901 they charged 3s. 4d. per 1000 cubic feet for gas, due, as the proprietors were aware, to the abnormal price the Company had to pay for coal, in that year the rate of increase was 6·2 per cent., while in the previous year it had been 13 per cent., and last year it was 10 per cent. Now he thought this was very noteworthy, as a clear indication that the price of gas influenced, directly and considerably, the amount of the consumption. He was quite sure that, when the conviction was established that the price of gas was a reducing quantity, the tendency was to burn and use gas more liberally; whereas a check such as the Directors were obliged to put on that idea by raising the price in 1901 had a directly opposite tendency. In the current year up to date, the sale of gas showed an increase, on the average, over the whole period of 17 per cent. In the month of January, it considerably exceeded 20 per cent. The reduction in the price of gas over the past year represented £11,000—that was to say, 4d. meant £11,000 remission to the consumers, and so much directly taken from the Company's balance of profit. Notwithstanding this, the income from gas over the year had been only, and almost exactly, £1000 less than it was in 1901—in other words, £10,000 out of the £11,000 had been recovered by the increase in the sale of gas. During the past half year, they had made 40 million cubic feet more gas; but the expenditure, allowing for a gain of about £600 on the sale of residuals, was practically the same as it was in 1901. The saving had been partly due to the reduction in the cost of materials, but had also been produced by economies in manufacture. He might say that they owed their excellent balance-sheet very largely to the use of carburetted water gas. As the proprietors were aware, the percentage of this gas that the Company used was considerable. They made from their ordinary coal a gas of an average quality of something under 14 candles—about 13½ candles—and they enriched this to a quality of 15½ candles. The average over the past year had been 15·90, or close on 16 candles. They brought up the poor coal gas to that quality by the use of oil gas made in the carburetted water-gas apparatus. During the past year, they had made the enriching gas (which was of a quality of about 19 candles) at fully 2d. per 1000 cubic feet less than the poor gas which had to be enriched—the enricher had been cheaper than the gas to be enriched. He would not stay to explain why they did not make all enriching gas and none of the poorer gas, because that was another story. Such, however, was the fact in regard to cost; and, this being so, the proprietors would understand why the Directors were not meanwhile anxious to reduce the quality of the gas they supplied to the consumers. The Company were about to have what some people would call competition in the district from electric light. The Local Authorities were going to introduce a supply of electricity into the district. He could assure the proprietors that the Board were not in any sense afraid of any adverse influence which the introduction of the electric light into the district might have upon the profits of the Company. They believed there was room for both; and all he could say for the Company was that they would part to their rival with just as little as they could possibly help. For himself, he repeated the expression of his great regret that there were to be two lighting authorities in the area. He was more satisfied from year to year that it was an unwise thing to have the supply of electricity and gas in the hands of two separate authorities in an area such as this. The Gas Company would have been able to supply the electric light to the ratepayers of the district, he was satisfied, at a lower rate than would be possible by the Local Authority, or any other authority, who had to bear all their own costs of management, administration, and so forth. The result to the ratepayers would have been equal to what the Company hoped it would now be (for they did not wish it other than success) in the hands of the Local Authorities. But it was too late to talk of this to those who were pledged to the introduction of the electric light; though he could not help making his moan over what he regarded as the mistaken policy adopted by the Local Authorities in this matter. The Company had to deplore this year an addition of 40 odd per cent. to the amount of their rates, as compared with this time last year. The portion of this due to increased assessment was but small; the greater part of it was owing to the increase in the amount of the rates themselves. Whether this movement of the rates would be modified by the introduction of the electric light by the Local Authorities, the future would show. He hoped sincerely that there would be a balance in the profit realized, which would go to the Company's benefit as very large ratepayers. [A PROPRIETOR: The rates will be far worse, Sir.] Judging by some illustrations, they might be. With regard to their own business, he did not think he had ever known it in a more lively and active condition than at the present time. The improvements in incandescent gas lighting were familiar to all the proprietors; but it was a matter of regret how slowly that system had taken hold of the consumers of gas generally in England. Abroad, the flat-flame burner for a couple of years past had been pretty nearly as dead as Queen Anne. One very rarely indeed saw it. But the incandescent burner was, of course, making its way rapidly; and it was an excellent weapon—an excellent implement—in the hands of gas companies to secure their business and to extend it. He need not say the introduction of the incandescent gas-burner had influenced very largely the conditions of the competition with the electric light undertakings. There was no doubt whatever that an equal light could be had from gas taking the price commonly ruling—say, the price in Tottenham, and the price at which electric light would be supplied there—at about one-sixth of the cost that had to be paid for electricity. This being so, the task of ousting gas from its position was not an easy one. In addition to this, for employment in workshops and large areas, the high-pressure gas that was now used with incandescent mantles had proved a most successful system, and an economical one. Then, as the proprietors knew, gas-engines were being employed largely for the generation of electricity, so that that which came as a rival remained as a friend. They were about to erect some large workshops at the gas-works; and they would make these shops an example of what good lighting should be, and would invite their neighbours (of whom there were a large number settled in Tottenham) with large factories to come and see them. After a few remarks as to the new and complete show-room the Company are fitting up in their new offices, the Chairman said the prepayment meter continued to be a fruitful source of revenue. During the past year, they had taken out of the prepayment boxes 6,298,080 pennies, of a gross weight of 58½ tons. The amount of money they had had from these boxes was £26,242; and the number of coin-meter consumers was now 12,013. This was a remarkable record; and the coin-meter consumers largely exceeded the ordinary gas consumers. With regard to the accounts generally, excepting the figures he had named, he did not think they called for any lengthened observation. Throughout, they appeared to him to be satisfactory. The most alarming item, he was bound to say, was the increase in the rates; but otherwise the accounts were very satisfactory. The expenditure on repairs and the upkeep of the works was fully maintained. He hoped that shortly it would be possible to reduce this, because the reconstruction work would be less in the years immediately following, than it had been during the last three or four years. At any rate, so long as it was necessary to spend money on the renewal of existing works, the revenue would have to bear it. He would conclude by saying that he regarded the future of the Company with as much confidence as he had ever done since he had had any association with it; and he had the approval of his colleagues in saying that, if their anticipations with regard to the price at which they would renew their coal contracts were realized (and he believed they would be), in that case they would very shortly be in a position to announce a further reduction in the price of gas to the consumers.

Mr. JAMES WAKREN seconded the motion.

Mr. W. HALL congratulated the Board on the excellence of the report. He saw they were going to carry over £6874, after paying the dividend, which was a very handsome one, considering the adverse state of things. The balance was the largest, he believed, that had ever yet been taken over. As to the electric lighting in the district, he thought Tottenham and Edmonton had quite sufficient rates to pay without burdening themselves with additional loans for experiments.

The motion was unanimously carried.

The DEPUTY-CHAIRMAN (Mr. D. Ford Goddard, M.P.) proposed the declaration of dividends at the rate of 6 per cent. on the "A" consolidated stock, and of 4½ per cent. on the "B" and "B" additional stock, less income-tax. Regarding the bogey of electric lighting, which occasionally would trail across the affairs of a gas company, he came from a town where all the streets were being torn up for the purpose of laying down wires for electric lighting. Being the Chairman of the Gas Company there, he had naturally had some little feeling about it, and on behalf of his brother proprietors he had looked into the question to see what effect the introduction of electric lighting had had upon the affairs of other gas companies. The result of that investigation had gone to show that, although doubtless the competition of the electric light might have reduced the rate of progress to some extent, it had in no sense obliterated the growth of the gas undertakings or the fair earnings of dividend on their working. Notwithstanding the competition of the electric light in the Tottenham district, he believed they would still progress in the ordinary way, though perhaps not quite at the rate which they had shown hitherto in so remarkable a degree.

Mr. H. D. ELLIS, in seconding the motion, observed that he was always glad to hear the Chairman lay down the soundness of the policy of reducing the price of gas whenever they could properly do so. He was happy to see from the accounts that, although the Directors reduced the price of gas last year by 10 per cent., or 4d. per 1000 cubic feet, the business had not only recouped that, but more, because it had increased more than 11 per cent. With regard to the rates, this was a sore point indeed; and if it had not been for the increase in the rates, the Company would have been able to sell their gas 1d. per 1000 cubic feet cheaper. This was a thing that would go home to the consumers—that, had it not been for the action of the Local Authorities, they would have been able, in all probability, to get their gas a penny cheaper. There was one thing with regard to the increase of the business which he heard with the utmost astonishment. He wished that other companies in which he was concerned could show the increase that the Chairman had told them had attended their sales of gas since the commencement of this year. He believed the Chairman said the increase approached 20 per cent. There were other companies—and larger concerns than this—who would be glad to say that they could see an increase of 3 per cent., or even 2½ per cent., for January. He knew of some. They could not expect that this large increase would be maintained with the present beautiful spring weather. But it was a splendid increase; and he heartily congratulated the Company upon it.

The CHAIRMAN said he agreed almost entirely with his friend Mr. Ellis; but he was anxious they should not constitute themselves censors of the action of the Local Authorities. While they might take a different view from them as to what the effect of their policy might be, they must assume the Local Authorities, in the action they were taking, were actuated by the fullest conviction that they were doing the best in the interests of the district. So long as they were doing that, the Gas Company were reaping a large amount of benefit from the growth of the population in the area of supply; and they would not complain of the rates so long as the district continued to prosper. With regard to the rates of increase in consumption, Mr. Ellis would be interested

to know that while in January the increase was 20·3 per cent., the rate fell in the first week of February to 14 per cent., in the second to 9 per cent., and in the third it had gone to 10 per cent. On the average, it had been 17 per cent. since the commencement of the year.

The motion was unanimously agreed to.

On the motion of Mr. JAMES CLOUDSLEY, J.P., seconded by Dr. BENJAFIELD, a hearty vote of thanks was passed to the Chairman and Directors. The latter gentleman remarked that he was glad the Board were directing the flow of new capital among the consumers in the district. The more they did this, the more would they counteract the bogey of electric lighting.

The CHAIRMAN, in heartily thanking the proprietors for their vote, remarked that on the Board they worked very cordially together. This was undoubtedly one of the secrets of their success. But the circumstances of the district were also very favourable to the success of an undertaking such as theirs. They had a growing district; and they tried to do the best with the circumstances as they found them. They would continue to do rightly if they attended sedulously to their own concerns; and if there were companies not quite so well circumstanced, and consequently not having such an amount of success, they would not make invidious comparisons, but would believe they deserved the success which they wished to them equally with themselves. Continuing, he acknowledged how much the success of the Company was due to the officers and their staffs. He specially spoke of the devotion of the Engineer (Mr. A. E. Broadberry) and of the Secretary (Mr. James Randall), and of the satisfaction which the Board felt with the services of the new Assistant-Engineer (Mr. John Terrace). Concluding, he moved a vote of thanks to them.

Mr. J. L. CHAPMAN seconded the motion, which was agreed to.

Mr. RANDALL, in responding, supplemented the statement of the Chairman respecting the coin meters. He said that from Jan. 6 to Feb. 20 of this year (40 days) they collected from the coin meters £5933 (weighing 13¾ tons, and representing 1,424,024 bronze coins), or an average amount collected per day of £148 6s. 8d., or nearly 7 cwt. of coins. This rate would not go on through the next month. It was a gradually diminishing quantity; but it showed that they were still increasing. During the same period, they put in 893 new installations on the slot system; so that he thought a good return for the current six months was assured.

Mr. BROADBERRY also briefly acknowledged the compliment; and the proceedings terminated.

BRENTFORD GAS COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held last Friday, at the Charing Cross Hotel—Mr. HOWARD CHARLES WARD in the chair.

The SECRETARY (Mr. William Mann) read the notice convening the meeting; and the report and accounts were taken as read.

The CHAIRMAN, in moving their adoption, said the Directors were happy to say that they met the proprietors with a fairly satisfactory report, as times went. The trading of the half year had resulted in enabling them to pay their dividends at the rate of 5 per cent. per annum on the 5 per cent. preference stock, 12 per cent. on the consolidated stock, and 9 per cent. on the new stock, 1881, and to carry over something to the good. They were transferring a sum of £3200 to the reserve fund, and what was left would go to the amount of undivided profit. As the report stated, there was £85,727 available for dividends. It also mentioned the increase in the sale of gas during the half year, which he considered very satisfactory indeed, especially when he remembered what had been done by other companies. The increase was 5·85 per cent., as compared with the half year ending Christmas, 1901. In that half year, the increase was 8·9 per cent. on the corresponding period of 1900; so that during the past half year they had an increase over the second half of 1900 of about 15 per cent. This, he thought, the proprietors would agree was very satisfactory, particularly when they considered the very light and mild weather they had had. This light and very mild weather did prevent the consumption of gas very materially. Even the South Metropolitan Gas Company had only had an increase of 2·3 per cent. He did not know exactly what the Brentford Company's larger increase was owing to (he supposed they attended to their business the same as other people did), but he thought it was due to the character of the district. In some districts round London, the increases were even larger. There was the Colney Hatch district for instance, where the increase was between 11 and 12 per cent. for the half year. He believed it might always be taken that these great increases—and increases and decreases generally—were due to the character of the district and the weather. If they had a district where houses were perpetually being put up (as in their own district for example, which was growing in all directions), the result was a continual increase in the gas consumption; and this, he believed, in their case would go on. They had 40 square miles of country in which building operations were going on very rapidly; and they would hope to see a constant increase in business. The Directors had been obliged to issue some new capital; and when he came to the accounts, the proprietors would see very good reason why this had to be done. They put the stock out at a reserve price of £180. The market price of the stock was certainly above that; but, in order to ensure its being placed, the Board fixed the reserve at £180. This would have given just 5 per cent. to anyone buying it. But even at that price the whole was not taken; and so, in accordance with the provisions of the Company's Act of 1881, they offered the balance to the proprietors. It was then speedily absorbed; and he thought the whole of it was taken at an average price of £181 16s. 3d. The works were in specially good order, both at Brentford and Southall. With regard to Southall they had been leisurely constructing a new inclined retort-house there; and he was happy to say the house was now finished, and twelve beds of retorts were ready for immediate use. Mentioning the question of the re-election of the retiring Directors, gave the Chairman the opportunity of saying that he was very sorry that one of the Directors [Mr. Basil T. Makins] was not present that day. He was very ill indeed; and he (the Chairman) could only say that all the Directors, and the proprietors too, greatly sympathized with him in his illness. They all hoped that they would soon see him with them again; but still his father (who was present) was very anxious about his son's condition. Turning to the accounts, he wished first to call attention to the capital account. They had added to it during the half year £30,260, and not before it was wanted. He would tell the proprietors why. If they looked at the account, it would be seen that there was a balance of cash at the end of the year of £26,259; so that, if they had not raised the £30,260, the capital account would have been depleted by about £4000 or £5000. He did not think the proprietors quite appreciated the necessity for this capital. If they looked at the general balance-sheet, it would be seen what the exact position was, but it would be shown more emphatically if they had a balance-sheet at Easter—at the end of the two heavy quarters. They had stock on hand in connection with the manufacture amounting to £45,000; and there was an amount of £84,996 due to the Company for gas and meter rental. And all that they had with which to meet this was (before the new stock was issued) a deficit on capital account. On the other side of the balance-sheet, they had an item "sundry tradesmen and others, for amounts due for coals, stores, and sundries, £34,595;" so that they had been doing, apparently without any capital at all, business which had cost them at least £90,000. They could not go on for ever in this way; and the reason they had been able to manage was because they had used the undivided profits as floating capital. This explanation would show how necessary was the raising of this new capital. There was another matter in the capital account he should like to draw attention to—that was, with reference to their system of writing off depreciation of stoves, prepayment meters and fittings, and so on. The total amount of the "new and additional meters and stoves" charged in the account was £9452; but the amount written off was £11,173. So that it would be seen that the capital was benefited on the half year to the tune of £2000 upon the amount of the stoves and fittings dealt with. So far as the revenue account was concerned, almost every item was favourable. Coal and oil had cost 14s. 8d. or 14s. 9d. per ton, as compared with 16s. 5d. in the corresponding half of 1901. Wear and tear had been charged very liberally. The gross expenditure had been about £141,011. Then they carried to profit and loss £54,577, as against £42,329. The result of the half-year's working was this: They had a balance of profit of £50,376. The dividend would amount to £36,325; and this would leave a surplus of £14,051. From this must be deducted about £3000 for the reserve fund. This fund could only be added to from the money the proprietors might divide; and so they had always heretofore kept back ½ per cent. since they established the fund. This amounted to £15,356, and now there would be the further £3000 to go to it. He was also very desirous that there should be an insurance fund. Sometimes nasty things came about. They had stoves, ordinary meters, and coin meters, and fittings, and so on all over the district; and, in his opinion, the Company would be in a much better position if they had an insurance fund, as well as the reserve fund. They could not start one this half year. But it struck him as being a desirable thing; and he hoped in the next half-year's accounts they would have something of the kind to show the proprietors.

Sir RICHARD H. WYATT seconded the motion.

Col. Sir W. T. MAKINS, Bart., said he desired, with the permission of the Chairman, to offer a few remarks upon the report and the lucid statement the Chairman had made to the proprietors. Though he (the speaker) was the Chairman of a neighbouring Company, he did not come to the meeting as a hostile critic in the guise of a candid friend. He came there to offer congratulations to the Chairman and his colleagues upon the excellent statement of working they had put before the proprietors that day. The Chairman had pointed out the fact, but he (Sir William) need not dwell on it, that the Company's lines were cast in very pleasant places. The causes which had contributed to the success of the Company were more than one. In the first place, the Company had an able Board, presided over by an able and experienced Chairman. The Board, too, were assisted with the advice of one who was for many years their principal officer; and, in addition to such a Board so composed, they had a district which (as the Chairman had described) contained about 40 square miles of what he might almost term "virgin soil." Well, other companies envied the Brentford Company this very much indeed. The Chairman and himself knew of a Company where the conditions were very different. The Company to which he referred had some 60 square miles of district, but nearly the whole of it was already built on. The third factor was that the Brentford Company were not subjected to so much competition from other systems of lighting. But he was not going to dwell on that circumstance. Every system of lighting must stand or fall on its merits; and they had no right to complain of fair competition. Competition which was paid for out of the rates to which they were the largest contributors, he thought they had a right to complain of, and they did complain of it; but against ordinary, fair competition they had nothing to say. He believed there was another reason why the Brentford Company were, and had been, so long prosperous; and that was that they were the pioneers in a system of carbonization—that was the inclined retort system—by which they had reduced the cost of carbonization as regarded wages to the tune of 50 per cent. Other companies had followed this one, and were finding similar results. The lead which the Brentford Company gave in that particular form of carbonization had been followed, with a few notable exceptions, by almost, he might say, the great majority of gas undertakings all over the country. That was another advantage. With all these advantages (he would not dwell upon this, because he did not desire to detain the meeting longer) the Company would naturally be successful. But he wished to say this: The Chairman and himself a fortnight ago were subjected to what he (Sir William) might term scurvy treatment on the part of a very small fraction—a decimal fraction in fact (laughter)—of the shareholders of the neighbouring Company, following

an attack made on the administration by a most prominent, most able, and gifted Gas Director and Chairman. If that criticism had been constructive instead of destructive—if it had been *bonâ fide* advice to the Board to do something which they had already left undone for the benefit of the Company—no fault could be found with it. But when the attack included a proposition which would have been ruinous to the Company, and omitted every feature in the Company's case which was in favour of their side, or mitigated their position, he could only consider that the attack was made—well, he could not understand with what motive, because the speaker knew what were the facts of the case. Why did not he put them forward? He (Sir William) did not wish to impute motives; but there must have been a knowledge of the facts, and the only reason one could give for such an attack was some motive he (Sir William) could not divine, or some temporary aberration. (Laughter) It was utterly impossible, as their Chairman had already said, to compare the results of gas companies working under varying circumstances; and before destructive criticism was passed upon them, the varying conditions ought, in fairness, to be borne in mind, and dealt with before the axe was allowed to fall. He thanked the Chairman sincerely for the kind words he had used respecting his absent colleague. His health was not in the most satisfactory state at the present time; but he (Sir William) did not abandon hope that, in a reasonable time, he might be better and able to return to business. At present, however, he was absolutely prostrate. He also thanked the Chairman for the lucid statement he had made, and for the most excellent report he had put before the proprietors. In conclusion, he asked that those people who were interested in gas companies generally should, when weighing the words they read and the reported statements at meetings, bear in mind the fact that varying circumstances did produce, and must produce, varying results.

The CHAIRMAN, replying to a question, said that gas was fast replacing steam in the district. Proceeding, he said he must thank Sir William Makins for his speech. They did all they could here and elsewhere for the benefit and for the promotion of the companies they served. He also wished to call attention to a statement made by Mr. Bradshaw, the Chairman of the Commercial Gas Company, that, although they had municipal trading in electric lighting in Poplar, they had got nearly all their gas consumers back, and electricity, except for public lighting, was almost disused. He (the Chairman) was happy to say they had also some experience of that sort of thing. They had the competition of the municipal traders at Ealing and Hammersmith. At Ealing, they did not seem to like electric lighting at all. The Company had there a great increase in incandescent gas-burners even for public lighting, although the municipal traders had the electricity in their own hands.

The motion was unanimously carried; and afterwards the dividends recommended were declared.

The CHAIRMAN moved the re-election of the retiring Directors (Mr. R. S. Adair and Mr. Frank Morris).

Sir W. T. MAKINS said he cordially seconded the motion which had been made for the re-election of these gentlemen, who were most ably qualified to occupy their positions; but he wanted to say this, that it was perhaps not known to those present that the Chairman and his able colleague, Mr. Burke, were also Directors of another Company, where things were not so rosy as they were in the case of the Brentford Company that day. He wanted to point out that these gentlemen did not change their natures. They were the same persons. He met them as Directors of this Company or of the other Company; and therefore if there was a comparison to be made to the detriment of the other Company, it could not be laid upon their shoulders; but it must, as he said before, more or less rest upon the varying conditions under which they worked.

The motion was unanimously carried.

The Auditors were re-appointed; and a resolution was passed raising the salary of the Secretary from £700 to £800 per annum. In connection with this matter, it was mentioned by the Chairman that the Directors had made an all-round increase in salaries at the works.

The usual vote of thanks to the Chairman and Directors, the Engineer and Manager (Mr. James Husband), the Secretary, and their staffs was heartily accorded.

NEWCASTLE AND GATESHEAD GAS COMPANY.

The Annual General Meeting of this Company was held at the Offices, Newcastle-on-Tyne, last Wednesday—under the presidency of Sir W. H. STEPHENSON.

The SECRETARY (Mr. T. Waddom) having read the notice convening the meeting,

The CHAIRMAN moved the adoption of the report (which was noticed in last week's "JOURNAL," p. 423). He said he did so with much satisfaction to himself and to his brother Directors, and, he believed, to the shareholders. They had been able during the year to meet the whole of their liabilities, to discharge all their lawful debts, and to pay the full dividend they were entitled to pay under the provisions of the Act of Parliament. In accordance with the Act of 1901, they had converted the whole of their stock, both preference and ordinary. The preference stock was converted from 5 per cent. to 4 per cent., making an addition of £19,625; and the ordinary stock from 7 per cent. to 3½ per cent., adding to capital £757,946—the total addition to capital under both heads having been £777,571. The capital expenditure during the year had been £117,524, which included items under the following heads: A sum of £28,895 upon the new gasholder in connection with St. Anthony's; new gas manufacturing plant, stoking machinery, and coke-conveying machinery at Redheugh, and coke-breaking machinery at Elswick; and £46,539 had been expended upon new mains and services for extensions—some of these to improve the supply in certain districts, and others to serve new streets and places in which new buildings were being erected. Building of premises had been exceptionally brisk during the period covered by the report—in fact, he believed that never before in the history of the Company had there been such earnest, energetic work in building extensions. They had expended £37,146 in consumers' premises—that was, for new meters £18,646, and new stoves £18,499, including penny-in-the-slot installations. Then there was a sum of £750 in further calls upon preference shares of the Redheugh Bridge, in accordance with the Act of 1896, in consideration of which they had secured an easement for their large service-pipes crossing the bridge, and received a dividend of 4 per cent. They had also spent a further sum of £4194 in stamp duty upon the new capital under the Act of 1901. The capital raised during the year had been: In preference stock, £62,041; in debenture stock, £30,000. The premiums, less the expenses of the issues, were £1840; and this, added to the previously mentioned sum of £92,041, gave a total of £93,882. The capital expenditure since the Act of 1896 had been large, but necessary, to provide manufacturing and storage plant to meet the increasing demand for gas; improvement of the system of mains and governors so as to secure to every consumer an ample supply of gas; the introduction of up-to-date labour-saving plant at the works; and the provision of meters, stoves, and fittings, more particularly for consumers supplied upon the automatic system. Most of these objects had now been practically accomplished, and the expenditure would, for a while, be upon a less extensive scale; but there was, of course, a good deal yet to do in penny-in-the-slot installations. The total revenue in 1902 was £362,539; and in 1901, £387,065. There was thus a decrease in 1902 of £24,526. The expenditure last year was £273,520; and in 1901, £324,113—or a decrease in the past year of £50,593. Taking the expenditure and the income together, there was an increased gross profit of £26,066 in 1902, as compared with 1901. The gross profit in 1901 was £62,952; and in 1902, £89,018. The revenue account showed the considerable saving in coals of £55,176. Carbonizing wages were £2312 less in 1902 than in 1901; and repairs of works were £2073 less. The sale of gas, in consequence of the reduction of 1d. per 1000 cubic feet on Jan. 1 last year, realized £11,823 less—that was to say, 1d. per 1000 cubic feet at present produced about £12,000. The rentals of stoves and meters yielded £3330 more, tar £3491 more, and sulphate of ammonia £2578 more. The Company supplied gas to about twenty villages in the suburbs; and the prices charged had not been revised for some years. They required readjustment, as they did not all bear equitable comparison with one another. This had now been done by the adoption of a scheme which would gradually unify the prices over the whole of each local authority's district; and reductions would take place automatically as the consumption of gas within each district increased. The reductions taking effect during the current year would amount to £1000. The gas sold was only a little over 2 million cubic feet more than in the previous year; but nevertheless it established a record. The smallness of the increase was mainly due to the mildness of the weather in November and December. In Newcastle, it was almost as cold on the longest as on the shortest day last year. The minimum temperatures, as registered at the "Chronicle" office, were 47·2° on June 21, and 47° on Dec. 21. The smallness of the increase was also partly due to the fact that manufacturers who used gas for motive power purposes were employing it in reduced quantities, owing to the existing depression of trade. The largely increased use of incandescent burners materially affected the sale, but what was the Company's loss in this respect was the consumers' gain. During the year, 21 miles of main pipes in extensions and renewals had been laid; and this showed the Company's determination to satisfy consumers as regarded a sufficient supply. No less than 9255 consumers had been added, making a total of 56,594. The total number in 1897 was 35,303, or an increase of 21,291 in five years. Then 8203 prepayment installations had been fixed, making a total of 13,288. This development of the business had been exceedingly rapid. Of ordinary cooking-stoves, 960 had been fixed, making a total of 5610; and additional public lamps had been erected, making a total of 11,553. The Company had undertaken, for a small quarterly payment, to keep the incandescent burners clean and supplied with mantles. The Directors regretted that they did not see their way at present to make any further reduction in the price of gas, as there had not as yet been any material fall in coal. The average price paid by the Company for coal, including cost of delivery into the retort-houses, during the years 1893 to 1897, was 7s. 2·74d.; and in the five years from 1898 to 1902 it was 10s. 4·47d. The cost in 1902 was 9s. 7·74d. The future prospects of the Company were exceedingly hopeful. Last year they earned the dividends, and had £6000 to spare. The works and mains were in good condition; complaints from consumers were comparatively few; and every effort was made to anticipate and meet the wants of consumers, and to help them. A trained staff was employed to advise consumers in all difficulties as to lighting, heating, and power. There was yet a wide field for automatic meters; and the heating-stove business could be extended by assisting consumers to obtain stoves upon the hire-purchase system, as had already been begun to a small extent with gas-engines. One means of reducing the price of gas was by lowering the illuminating power. At first sight, this would appear a course detrimental to the interests of the consumer; and so it was, once upon a time—he referred to the period prior to the introduction of the incandescent burner, the cooker, gas-fire, and gas-engine. But now, owing to the extended consumption by these methods, the enrichment of gas was unnecessary; and this being so, and as it cost money, that money was wasted, and would be better in the pockets of consumers. Of course, the standard could not be lowered without the permission of Parliament; but he asked the local authorities controlling the districts served by the Company to consider whether it would not be to the advantage of the consumers to reduce the standard, and thus enable cheaper gas to be supplied.

Mr. E. A. HEDLEY seconded the motion, and it was agreed to.

On the proposition of the CHAIRMAN, seconded by Mr. W. R. PLUMMER, M.P., dividends were declared for the half year on the converted preference stock at the rate of 4 per cent. per annum, and on the ordinary stock at the rate of 4½ per cent. per annum.

A Special Meeting was subsequently held, at which power was given to the Directors to increase the capital by the creation of £50,000 new ordinary stock, and a like amount of new preference stock.

CROYDON COMMERCIAL GAS COMPANY.

Half-Yearly Report and Accounts.

At the Meeting of this Company next Friday, the Directors will present a report which will show satisfactory working results on the six months ending the 30th of December last. The prices paid for coal and oil were less than those of the second half of 1901, and consequently there is a saving under this head, although the quantities used were greater. The quantity of gas sold—viz, 423,341,600 cubic feet—exceeds that of the corresponding period of 1901 by 8·47 per cent.; while the receipts from the sale of gas show an increase of £1428, which would have been augmented by £3486 had not the price been reduced by 2d. per 1000 cubic feet. Although the amount realized by the sale of coke is less than during the corresponding period of 1901, the results from the sale of residuals generally show a marked improvement. The total number of consumers at the end of the half year stood at 19,237, or 931 more than at the commencement; while the increase in the number of stoves on hire was 620. The Directors have entered into an agreement with Miss Ball, L.C.A., who has opened a School of Cookery in Croydon, to give weekly lectures on cooking and the use of the gas-stove. To these lectures consumers are admitted free on production of tickets to be obtained at the Company's Offices. They can also obtain orders entitling them to receive at convenient times private instruction in the use of gas-stoves, either at the School of Cookery or at their own homes. The new plant at Waddon, of which a description has already been given in the "JOURNAL," has been in satisfactory operation for some time.

The accounts accompanying the report show that the revenue from the sale of gas in the past half year amounted to £58,865, compared with £57,437 in the second half of 1901; meter and stove rentals produced £4944, against £4433; residuals, £16,154, against £15,215; and the total receipts were £80,032, compared with £77,164. The manufacture of gas came to £45,671, compared with £44,143; distribution, to £8344, against £7337; management, to £2614, against £2574; and the total expenditure was £62,569, compared with £59,566. The balance carried to the net revenue account is £17,463, whereas this time last year it was £17,598. The balance available for distribution is £17,926; and the Directors recommend the declaration of dividends at the following rates per annum: 14 per cent. on the consolidated "A" stock, 11 per cent. on the "B" stock, and 9 per cent. on the "C" stock, on the £20,000 paid on the Carshalton capital ordinary shares for the half year, and on £5000 consolidated "C" ordinary stock for one month ending Dec. 31, 1902—all free of income-tax. These payments will take £17,171, and leave £755 to be carried forward. The statements relating to the working show that, under the supervision of Mr. James W. Helps, M.Inst. C.E., the Engineer and General Manager, 28,932 tons of coal, 35 tons of cannel, and 435,443 gallons of oil were employed in the past half year in the manufacture of 460,029,000 cubic feet of gas, of which 423,341,600 cubic feet were sold, and 428,797,000 cubic feet accounted for. The estimated quantities of residuals produced were; Coke, 17,380 tons; breeze, 4560 tons; tar, 380,079 tons; and ammoniacal liquor, 866,125 gallons—the quantity of sulphate made being 264 tons.

PROVINCIAL GAS AND WATER COMPANIES.

GAS.

A "Record" Year at Barnstaple.

A record was established by the Barnstaple Gas Company last year, when the consumption showed an increase of no less than 4,900,000 cubic feet over 1901. The year's working was in all respects satisfactory; and the Chairman (Mr. W. C. Rafarel) explained, at the recent annual meeting, that the question of reducing the price had been under consideration, but action had been postponed for two reasons. One was that the coal supply seemed a little uncertain, in view of the demand from America; and the other was that they had to face the prospect of increased rates, because of the introduction of electric lighting. As to the future, he predicted that the Company would be paying dividends when the ratepayers would be dipping deeply into their pockets for the interest and sinking fund charges on the undertaking. Incidentally, the Chairman criticized the Corporation for not adopting incandescent lighting for the street-lamps outside the electric lighting area, and for allowing the lamps to be kept in a dirty condition.

Gas Supply in North London Suburbs.

The accounts of the Colney Hatch and North Middlesex Gas Companies for the past six months show that the gas supply in their districts is steadily increasing. The first-named Company sold 12¾ per cent. more gas than in the last half of 1901; and the revenue from the sale was £8610. The total receipts were £10,622; the total expenditure was £8168—the balance carried to the profit and loss account being £2454. The balance of net profit is £3794; and the amount required for dividends is £2150. The Directors recommend dividends for the half year at the rates of 10, 7, and 5 per cent. per annum on the original, additional, and preference capital. There was a further development of the business of the North Middlesex Gas Company in the second half of the past year. The revenue from the sale of gas was £11,405, and the total receipts were £13,644. The expenditure being £9823, the balance carried to the profit and loss account is £3821. The amount available for distribution is £5162; and the Directors recommend dividends at the rates of 10, 7, and 5 per cent. per annum. After transferring £356 12s. 10d. to the credit of the reserve fund, there will be a balance of £2253 15s. 7d. to be carried forward. The Company's business has further developed; an increase of 7¾ per cent. in the gas sold having taken place.

Incandescent Mantle Complaints at Newmarket.

At the annual meeting of the Newmarket Gas Company, on Monday of last week, complaint was made by a shareholder that since the price of incandescent mantles had been reduced from 1s. 1d. to 6d., the quality had deteriorated. They did not seem to last half the time; and he said that he would sooner give 1s. 1d. for the old mantles than 6d. for those he got now. The Manager and Secretary (Mr. J. H. Troughton) replied that since the mantles had become cheaper there had been one or two complaints; but he had not noticed much difference. People hawked mantles about at 2d. and 3d.; and he would like to warn everybody against buying them, for he was certain they were no good. The Company had some very good mantles, which they had tested for two months, and which they could sell at 4d. The Welsbach mantles were the best procurable; and the Company were not allowed to sell them at less than 6d. each. They were supposed to be the same as those formerly sold at 1s. 1d.; and he believed they were cheaper than the 4d. ones, as they lasted longer. The shareholder remarked that fifty persons had told him the mantles did not last so long now as formerly; and he had found it to be the case himself. Turning to the business proper of the Company, it will be seen that there is, at any rate, no fault at all to be found with that. Last year the sale of gas was larger than ever before; and the present year showed a further increase. The net balance of profit earned during 1902 was £3399, which allowed of the declaration of a dividend at the rate of 6½ per cent. upon the original consolidated stock of the Company.

Making Up Leeway at Scarborough.

At the half-yearly meeting of the Scarborough Gas Company, on the 14th inst., the Chairman (Mr. B. Fowler, J.P.) referred to the slight falling off of about £70 in the total income for the six months ending the 31st of December, compared with the latter half of 1901. He explained that the principal drop was in the sale of gas to private consumers (£333), resulting mainly from the economy exercised owing to a bad season, but also from the extended use of incandescent burners. Of course, these burners check consumption at first; but the Chairman recognized the truth of the remark made in the "JOURNAL," to the effect that they are really friends in disguise, as, in the long run, they increase it. The small reduction in the sale of gas was, however, almost balanced by increases in other directions. Residuals brought in £135 more, and stove and meter rental £102 more; the improvement in the former case being due to the better price obtained for sulphate of ammonia. Altogether, the half year was a very successful one, as the Company not only made up a good deal of leeway, but were able, after paying the maximum dividends, to carry forward a substantial sum. In answer to a question, it was stated that the Manager and Secretary (Mr. Alexander Allan) produced 11,731 cubic feet of gas per ton of coal carbonized; and he was complimented on the result. The Directors were also congratulated upon the small amount of bad debts, and were thanked for their services. At an extraordinary meeting held after the general business had been disposed of, the shareholders gave their sanction to the Bill which is being promoted by the Company to enable them to raise more capital, and for other purposes.

Extension of the Prepayment System at Wakefield.

At the recent half-yearly meeting of the Wakefield Gas Company, under the presidency of Dr. Statter, J.P., the accounts presented showed that after deducting £840, carried to the suspense account, there remained a balance of profit of £7156, from which the Directors recommended the payment of 11½ per cent. per annum on the original shares, and 9 and 8½ per cent. per annum on the new ordinary shares, less income-tax. In moving the adoption of the accounts, the Chairman remarked that there had been a slight decrease in the consumption of gas during the six months ending Dec. 31, owing to the abnormally mild weather, but that there was an increase of 4,025,000 cubic feet in the quantity of gas sold during the year. The accounts were very satisfactory, as they allowed the Directors to pay the full statutory dividends, write £840 off the suspense account, and carry forward a balance (£1281) to the credit of the profit and loss account, all out of the profit earned during the period covered. During the past year, 1000 prepayment meters had been fixed, bringing up the total number to more than 4000, from which upwards of a million pennies had been taken. They were continually receiving applications from new consumers of gas; and, in consequence of the extra business, the capital account had been overdrawn to the extent of £6127, which would render it necessary shortly to raise additional capital. The report was adopted, and the dividends recommended were declared. Votes of thanks were accorded to the Chairman and Directors, as well as to the Engineer (Mr. H. Townsend) the Secretary (Mr. W. H. Parker), and the staff, for their services.

Increased Capital and Other Powers at Ipswich.

Mr. D. Ford Goddard, M.P., the Chairman of the Ipswich Gas Company, remarked that the report and accounts which the Directors had to submit to the annual meeting last week might be summed up in the one word "satisfactory." The capital expenditure of the Company only amounted to £4 14s. 6d. per ton of coal carbonized, which compared most favourably with other gas companies in the kingdom. In spite of the fact that the price of gas was reduced from 2s. 10d. to 2s. 8d. per 1000 cubic feet last July, the increase in the sales had been so large that there had been a gain of £1461 on the year's receipts under this head. On the other hand, however, residuals had realized £1822 less, so that there was a small decrease in the net revenue. The only items of the expenditure side of the revenue account which did not show an increase were repairs and maintenance of works, which showed a reduction of £387, and the cost of lamps, which was £229 less. The latter, of course, was mainly due to the reduction in the price of incandescent mantles. The Directors thought it good policy to give the town the benefit of this, and to make a reduction in the price of the mantles supplied for the purposes of public lighting. The Board had also tried to work in harmony with the builders of the town,

by a special scheme by which the builders had arranged to fix pipes in all new houses that were erected. They thought this was a good safeguard, in view of the fact that a certain competition was coming upon them. The builders fell in with the suggestion; and in most of the new houses erected in the town during the past year, gas pipes had been fixed. There was another reason for this scheme. Where there was an unsatisfactory supply of gas, and complaints arose, it was largely due to the fact that the builders had, for the sake of cheapness, put in too small pipes. By the present arrangement, the Company secured that the pipes were of an adequate size to meet the normal requirements of the house; and the results were advantageous to the Company, the builders, and the tenants. The increase of business had been very considerable. During the year, the Company had fixed 940 ordinary and coin meters, which made the total now in use 9757. Of these meters, 5921 were on the slot system, which would at once reveal what a tremendous accession to business this arrangement meant to the Company. They had fixed 441 gas-cookers, making a total of 3049 in use. This was the branch of the business that they pressed with as much energy as possible, because they felt that, whatever might be said in regard to lighting houses, they still held the field in respect to heating and cooking. Five fresh gas-engines had been fixed, making 128 in use in the town at the present time, which the Directors regarded as satisfactory. The arrangement started two years ago for keeping incandescent burners and outside lamps clean and in order, had continued to make steady progress. During the year, 247 burners and 14 lamps had been added, making the totals 931 and 73 respectively. The report was adopted; and dividends at the rates of 12½, 10, and 9½ per cent. on the various classes of stock were declared—making, with the interim dividends, 12¼, 9¾, and 9¼ per cent. for the year. This was an increase of ½ per cent. Votes of thanks having been passed to the Chairman and Directors, the Secretary and Engineer (Mr. J. T. Jolliffe), and the staff, an extraordinary meeting was held, for the purpose of considering the Bill which the Company are promoting for power to increase the capital, to acquire additional land, and for other purposes. The Chairman, in moving that the Bill be approved, gave a short history of the undertaking, and said he believed that, at 2s. 8d. per 1000 cubic feet (the price at Ipswich), gas was really the cheapest agent known for light, heat, or power. He would like to emphasize this point, because he knew that in these days—especially in places like Ipswich, whose narrow streets were being pulled up for the purpose of electric lighting—shareholders might be getting fidgety as to where their future profits were to come from. He took this opportunity of reassuring them on the point; the Directors had no fear in regard to that competition. Now they had incandescent gas-burners, they could do a great deal more than they could before. By this means, a room 20 feet square could be brilliantly lit for a whole winter's evening for a halfpenny. He ventured to say that no electric light undertaking could possibly do a thing of that kind. Another branch which it was very important for them to consider was the question of producing power. They believed that, by means of gas, one could produce power cheaper than by any other agency. A 10 brake horse power gas-engine could be worked for a whole day of twelve hours for 4s., or ½d. per brake horse power per hour—just about the cost of the labour alone in attending a steam engine and boiler of the same power, leaving out of count altogether the lessened capital charges, saving of space, cleanliness, and handiness of working. No doubt electric light competition, especially when conducted by a municipality, would reduce the rate of increase in the business of gas undertakings; but they were not afraid that it would take it away altogether. To be satisfied on this point, they had only to look at the towns in England supplied with electric light, and ascertain what effect it had had on the sale of gas. Such an investigation would show that, under these conditions, the gas business continued to increase, even in towns where the price was a great deal higher than at Ipswich; and therefore he concluded that, if other towns could show large increases, the Ipswich Gas Company would enjoy very much larger and more permanent ones. They had already secured suitable sites for the erection of additional gasholders; and it would also be necessary to adopt a new method of charging and drawing the retorts, as it was desirable to use mechanical power. The resolution approving the Bill was then carried.

WATER.

South Staffordshire Water Company.

At the meeting of this Company on Thursday, the Directors will report that the number of houses laid on during the past half year was 2462; making the total supplied 117,035. The gross amount of water-rates was £60,503, against £58,292 in the corresponding period of 1901. After providing for interest on the debenture and preference stocks, the amount remaining for distribution (including £6687 brought forward) is £26,367; and the Directors recommend the declaration of a dividend on the ordinary stock at the rate of 6½ per cent. per annum, free of income-tax. The amount of the dividend being £20,354, there will remain £6013 to the good.

More Water Required at Sutton.

At the recent half-yearly meeting of the Sutton (Surrey) Water Company, under the presidency of Sir Allen Sarle, the Directors reported a gross rental of £10,064 in the six months ending Dec. 31 last; being £384 in excess of that for the corresponding period of 1901. The balance of profit, including £983 brought from the previous half year, amounted to £5067; and the Directors recommended the payment of a dividend at the rate of 10 per cent. per annum, free of income-tax, amounting to £3000, and the carrying of £1000 to the reserve account for depreciation, &c.—leaving a balance of £1067 to be carried to next half-year's account. Referring to the decision to apply to Parliament for power to raise more capital in order to obtain an additional supply of water, the Directors pointed out that the excessive drought of the past three years had reduced to such an extent the level of the water in the Company's wells, that it had become necessary to

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 475.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 15	10½	Alliance & Dublin 10 p.c.	18½—19½	..	5 7 8
100,000	10	,,	7½	Do. 7 p.c.	13—14	+½	5 7 2
200,000	5	Nov. 13	6½	Bombay, Ltd.	5⅞—6⅛	..	5 4 0
40,000	5	,,	6½	Do. New, £4 paid	4¼—4⅝	..	5 9 5
380,000	Stk.	Aug. 14	12	Brentford Consolidated	247—252	..	4 15 3
286,700	,,	,,	9	Do. New	182—187	..	4 16 3
50,000	,,	,,	5	Do. 5 p.c. Pref.	136—141	..	3 10 11
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	110—113	..	3 10 10
220,000	Stk.	Sept. 11	10¾	Brighton & Hove Orig.	212—217	+3	4 19 1
246,320	,,	,,	7¼	Do. A. Ord. Stk.	155—160	..	4 16 11
460,000	20	Sept. 26	10	British	39½—40½	..	4 18 9
50,000	10	Aug. 14	12	Bromley, Ord. 10 p.c.	—	..	—
82,850	10	,,	9	Do. 7 p.c.	—	..	—
500,000	10	Oct 15	7	Buenos Ayres (New) Ltd.	10½—11	..	6 7 3
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	92—94	..	4 5 1
150,000	20	July 11	8½	Cagliari, Ltd.	23—25	..	6 12 0
100,000	10	Sept. 26	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	53—55	..	5 9 1
1,375,000	Stk.	—	5†	Commercial 4 p.c. Stk.	107—110	..	4 10 11
503,750	,,	—	4¾†	Do. 3½ p.c. ,,	101—104	..	4 11 4
407,812	,,	—	3	Do. 3 p.c. Deb.,	90—91	..	3 4 6
800,000	Stk.	Dec. 11	8	Continental Union, Ltd.	120—150	−2½	6 3 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	140—145	..	4 16 7
575,000	Stk.	Aug. 28	5⅛	Crystal Palace Ord. 5 p.c.	117—122	..	4 7 4
60,000	,,	,,	5	Do. 5 p.c. Pref.	120—125	..	4 0 0
106,158	,,	Jan. 15	5	Do. 5 p.c. Deb. Stk.	137—140	..	3 11 5
486,090	10	Jan. 29	10½	European, Ltd.	18—19	+½	5 10 6
354,060	10	,,	10½	Do. £7 10s. paid	13—14	..	5 12 6
15,243,200	Stk.	Feb. 12	4⅛	Gas-light and Coke — 4 p.c. Ord.	83—85*	..	5 3 6
2,600,000	,,	,,	3½	Gas-light and Coke — 3½ p.c. max.	86—88*	..	3 19 7
3,799,735	,,	,,	4	Gas-light and Coke — 4 p.c. Con. Pref.	106—109*	..	3 13 5
4,193,975	,,	Dec. 11	3	Gas-light and Coke — 3 p.c. Con. Deb.	91—93	..	3 4 6
252,500	Stk.	Sept. 11	5	Hastings & St. L. 3½ p.c.	90—95	..	5 5 3
70,000	10	Oct. 30	8	Hongkong & China, Ltd.	14½—15½	..	5 3 3
3,800,000	Stk.	Nov. 13	10	Imperial Continental	204—207	−2	4 16 7
473,600	Stk.	Feb. 12	3½	Do. 3½ p.c. Deb. Red.	100—103*	+2	3 8 0
158,242	Stk.	Aug. 28	6	Lea Bridge Ord. 5 p.c.	115—120	..	5 0 0
561,000	Stk.	Aug. 28	10	Liverpool United A	224—226	..	4 8 6
718,100	,,	,,	7	Do. do. B	165—167	..	4 3 10
306,083	,,	Dec. 31	4	Do. do. Deb. Stk.	114—116	..	3 9 0
75,000	5	Dec. 11	5	Malta & Medn., Ltd.	4½—5	+¼	5 0 0
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	105—109	..	4 11 9
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	103—105	..	4 5 9
541,920	20	Nov. 13	3½	Monte Video, Ltd.	9½—10½	..	6 13 4
1,515,892	Stk.	Feb. 20	4½	Newc'tle & G'tesh d Con.	102¾—103¾*	..	4 7 0
346,855	Stk.	Jan. 2	3½	Do. 3½ p.c. Deb.	97—98	..	3 11 5
300,000	Stk.	Nov. 27	8	Oriental, Ltd.	143—148	..	5 8 1
600,000	5	Sept. 26	7	Ottoman, Ltd.	6—7	..	5 0 0

* Ex. div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
105,005	Stk.	Jan. 15	6⅝	Ply'mth & St'house 5 p.c	127—132	+4	4 12 9
851,070	10	Oct. 15	7	River Plate Ord.	10½—11	..	6 7 3
300,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
250,000	10	Sept. 26	8	San Paulo, Ltd.	11⅝—12½	..	6 8 0
135,000	Stk.	Sept. 11	10	Sheffield A	236—238	..	4 4 0
209,984	,,	,,	10	Do. B	234—236	..	4 4 9
523,498	,,	,,	10	Do. C	234—236	+1	4 4 9
103,235	Stk.	Sept. 26	5	Shrewsbury Ord. 5 p.c.	113—116	..	4 6 2
6,000,000	Stk.	Feb. 12	5⅜	South Met., 4 p.c. Ord.	119—121*	..	4 8 2
1,780,000	,,	Jan. 15	3	Do. 3 p.c. Deb.	91—93	..	3 4 6
380,940	Stk.	Nov. 13	5	Southampton Ord.	103—107	..	4 13 6
87,950	,,	Jan. 15	4	Do. 4 p.c. Deb.	100—103	..	3 17 8
120,000	Stk.	Aug. 28	6	Tottenham and Edmonton — A. 5 p.c.	118—123	..	4 17 7
300,520	,,	,,	4⅜	Tottenham and Edmonton — B. 3½ p.c.	93—96	..	4 13 9
182,380	10	Dec. 30	5	Tuscan, Ltd.	8½—9½	..	5 5 3
140,000	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	94—96	..	5 4 2
750,872	Stk.	—	5†	West Ham, 5 p.c. Ord.	97—102	..	4 18 0
				WATER COMPANIES.			
780,662	Stk.	Dec. 30	11⅛	Che's'a, Ord.	315—325	..	3 10 9
150,000	,,	,,	5	Do. 5 p.c. Pref.	150—155	..	3 4 6
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	138—143	..	3 2 11
175,785	,,	Sept. 26	4½	Do. 4½ p.c. Deb.	140—145	..	3 2 1
1,720,560	Stk.	Oct. 15	8	East London, Ord.	222—233	..	3 8 9
654,740	,,	Dec. 11	4½	Do. 4½ p.c. Deb.	142—147	..	3 1 3
1,282,943	,,	,,	3	Do. 3 p.c. Deb.	97—99	..	3 0 7
700,000	50	Dec. 11	8	Grand Junction — 10 p.c. max.	117—122	..	3 5 7
310,000	Stk.	Sept. 26	4	Grand Junction — 4 p.c. Deb.	125—130	..	3 1 7
708,000	Stk.	Aug. 14	10¾†	Kent	305—315	..	3 6 8
160,000	,,	,,	7	Do. New, 7 p.c. max.	200—210	..	3 6 8
1,043,800	100	Dec. 30	11	Lambeth, 10 p.c. max.	305—315	..	3 9 10
406,200	100	,,	8½	Do. 7½ p.c. max.	220—230	..	3 13 11
350,000	Stk.	Sept. 26	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
500,000	100	Feb. 12	12⅛	New River, New Shares	390—400*	..	3 4 0
1,000,000	Stk.	Jan. 29	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
902,300	Stk.	Dec. 11	7	South-wark and Vauxhall — Ord.	203—208	−4	3 7 4
126 500	100	,,	7	South-wark and Vauxhall — 7½ p.c. max.	200—210	..	3 6 8
489,200	Stk.	,,	5	South-wark and Vauxhall — 5 p.c. Pref.	151—154	..	3 4 11
1,019,585	,,	Oct. 15	4	South-wark and Vauxhall — 4 p.c. A Deb.	125—130	..	3 1 7
1,155,066	Stk.	Dec. 11	10	West Middlesex	290—300	−5	3 6 8
200,000	,,	,,	4½	Do. 4½ p.c. Deb.	140—145	..	3 2 1
200,000	,,	Sept. 11	3	Do. 3 p.c. Deb.	97—99	..	3 0 7

* Ex. div.

† Next dividend will be at this rate.

find a further supply, in order to meet the demands of the rapidly increasing population in the Company's district. Land had been secured at the cost of £1545. The report was adopted, and a 10 per cent. dividend declared. At the special meeting held to obtain the shareholders' sanction to the promotion of the Bill, the Chairman expressed regret that they should have again to go to Parliament. The last time they did so, fifteen years ago, they had the greatest difficulty in carrying their Bill. They had to divide the House of Commons no less than three times before they could get what they wanted; and he hoped they would not have the same ordeal to go through again. Their object was to obtain more water. The head of water at the works had fallen from 18 feet to 12 feet in three years; while Carshalton, Wallington, Purley, and other parts of the district, were daily increasing. Before deciding what to do, the Directors had taken the advice of Mr. Baldwin Latham. The meeting unanimously approved of the promotion of the Bill.

Hard v. Soft Water at Leatherhead.

For some time past, the Directors of the Leatherhead and District Water Company have been persistently urged by a section of the consumers to put down a water-softening plant; but they have so far not been able to convince themselves of the necessity for the adoption of such a course. At the half-yearly meeting of the Company last Thursday, the question was again discussed, though only in an informal manner; a petition in favour of softening the water, signed by about 160 consumers, having earlier in the day been placed before the Board. Mr. W. B. Brown, J.P., who presided, stated that the matter would certainly receive the careful attention of the Directors; but it did seem to him that it would be a great waste to soften millions of gallons of water that required no such treatment, for the sake of the small quantity that did. One of the signatories to the petition was the Secretary of the St. John's Foundation School at Leatherhead; but if this Institution wished to have their water softened, they could most easily do it themselves. The Company had now about 2000 consumers; and undoubtedly very many of them preferred that the water should remain in its present condition. It was, after all, not so hard as that supplied by many other companies. It was well known at the time the Company started business that the water would be hard; and there was then no question whatever as to its being softened. The Directors had not in any way made up their minds on the matter; but he thought they would be making a very great concession indeed to the consumers if they determined to incur the large expense of laying down plant for softening purposes. Mr. A. Bird said he doubted very much whether all the consumers wanted the water softened; for if this were done, certain trades would not be able to use it. Those, however, who did prefer it softened, could carry out the process for themselves at a very cheap rate. He did not know the hardness of the Leatherhead water; but he had in his hand a letter which he received some years ago from a gentleman fully competent to speak on the subject, and in which the writer said that the water supplied by the East London Company possessed 19° of hardness, that of the Chelsea Company 16°, the Grand Junction Company's 17°, and the Kent Company's 28°. The Chairman remarked that, according to a recent analysis by Dr. Thresh, the Leatherhead water was of 17° hardness. Sir William Vincent said that he believed the water could be softened at a cost of not more than ¼d. per 1000 gallons; and he thought it certainly ought to be done. The Chairman stated that the estimate of their Engineer (Mr. F. S. Cripps) was that suitable apparatus would cost from £4000 to £5000; and his opinion was that the work of softening the water would entail an outlay of £1000 a year on the Company—which was just about the amount available for the past six months' dividend. Mr. Bird pointed out that the letter from which he had quoted gave the cost of softening at ¾d. per 1000 gallons. Sir W. Vincent, however, replied that at Southampton the water was treated at a cost of ¼d.; and he believed this was also the figure at Caterham. Apart from this disturbing factor, the Company are in a most satisfactory position, as the report submitted to the shareholders fully demonstrated. For the first time in the twenty years' history of the undertaking, a dividend at the rate of 6 per cent. was declared; but the Chairman was careful to point out that those who were original shareholders had, taking one year with another, only received a very modest return on their investment up to the present time. The receipts for the half year amounted to £2997, and the working expenses to £1759; leaving a profit of £1238. To this had to be added £988 brought from the previous accounts, making a total of £2226. After payment of the dividend, there will be a balance of £992 to be carried forward. The Company are applying to the Board of Trade for power to raise £40,000 in shares, with the usual borrowing powers.

PROPOSED LOAN FROM THE BRADFORD GAS RESERVE.

The minutes of the Gas Committee submitted for adoption at the meeting of the Bradford City Council on the 10th inst. included a resolution that the Council be recommended not to allow any part of the gas reserve fund to be used for the purpose of the loan for the Cartwright Memorial Hall, as proposed by the Special Sub-Committee appointed by the Council in reference to the matter. Alderman Toothill remarked that, by the instructions of the Council, an exhibition was being arranged to celebrate the opening of the Cartwright Memorial Hall. It was understood from the first that the Council would have to find funds to carry on the work until receipts came in; and the only source whence they could legally draw these funds was formed by the gas profits. A large amount of time had been spent on the exhibition; and promises of most influencial support had been received. Unless the Committee could have seen the prospect of a decent profit on the exhibition to provide funds for furnishing the galleries, they would not have undertaken the exhibition. He contended, therefore, that the

THE DAVIS GAS STOVE CO., LD.

The 'POPULAR' GRILLER.

A New and Cheap Breakfast Griller of simple and novel construction, fitted with Cast-Iron Sliding Deflector with studded bottom. Can also be used as a Boiling Stove.

SIZE—6 in. high; 10 in. wide; 7 in. deep.

PRICE 4s.

Absolutely the Cheapest Griller in the Market.

Special Line of Cheap Boiling-Stoves.

The "REX."

This Stove is made of Cast-Iron **in one piece.**

SIZE—Length 9½ in., Diameter 5½ in.

PRICE 1s.

LONDON, LUTON, & FALKIRK.

Head Office: 200, CAMBERWELL ROAD, S.E. **City Show-Rooms: 59, QUEEN VICTORIA STREET, E.C.**

money was really as safe in the possession of the Cartwright Hall Committee as it would be in the bank. Mr. Godwin moved, as an amendment, that the minutes be adopted with the exception of the resolution in reference to the loans from gas profits to the Cartwright Hall Committee. He pointed out that the gas profits reserve amounted to £20,000. From this, the Cartwright Hall Committee proposed to borrow £15,000, simply as a loan. Mr. Spencer, in opposing the amendment, said that owing to the large amount which had been taken from the gas profits for the relief of rates in the last two or three years, and the fact that 8d. per 1000 cubic feet was being lost on gas supplied in the added districts, owing to the high prices paid for the Gas Companies' works there, the gas reserves, which were £82,000 a few years ago, were now reduced to £25,000. But against this the Gas Committee had a debit balance of £20,000; so that the available assets of the Committee only amounted to £5000. He contended that the £15,000 should be taken from the insurance fund. Mr. Smith thought it was extremely regrettable that the discussion should take place in public, as it might give the influential people whose patronage and assistance the Committee had been at some trouble to secure, the idea that the support of the scheme was that of a section of the Council only. Alderman Hind said he had tried in committee to secure the aid for which he now moved. He was certain that the loan from the gas funds would simply increase the bank balance. Mr. Godwin's amendment was eventually carried by a large majority—only about ten members voting against it.

SALES OF SHARES AND STOCKS.

At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards sold, under instructions of directors and others, stocks and shares in various gas and water undertakings. The most important feature of the sale was the offer of £6000 of 4 per cent. perpetual debenture stock of the Ilford Gas Company, which was placed at prices ranging from £100 to £101 per cent. Next in importance was a new issue of £5000 of 5 per cent. ordinary stock of the South Essex Water Company (entitled, in view of the last dividends paid, to a proportionate dividend at the rate of 4 per cent. per annum), which fetched £105 and £106 per £100 of stock. On the same occasion, some £10 fully-paid ordinary shares in the Gas-Meter Company, Limited, were put up by order of an executor. The dividend on these shares has for many years been at the rate of 10 per cent. per annum, with the addition each year of large bonuses, averaging a further 10 per cent., equivalent for the last six years to 20 per cent. for each year. They realized £29 10s. and £30 apiece, *cum div.* as from Dec. 31. A new issue of "C" shares in the Harrow and Stanmore Gas Company, ranking for a dividend of 7 per cent., subject to the sliding-scale (last payment was at the rate of £5 12s. per cent.), was sold at £10 5s. and £10 7s. 6d. per share. Items in the particulars were small parcels of original and new ordinary stock of the Gosport Water Company; but they were not sold. This has hitherto been a prosperous undertaking; maximum dividends at the rates of 10 and 7 per cent. per annum having till recently been regularly paid since 1883. There has, however, been a drop to the extent of 2½ per cent. in the former, and of 1¾ per cent. in the latter. A retrograde movement in the case of a water company is a most unusual occurrence; and this check to the hitherto uninterrupted prosperous career of the one in question can only be accounted for by the serious position into which the undertaking has been allowed to drift, and the dissatisfaction which has resulted. The owner of the stock evidently hopes that the lost ground will be recovered; and therefore he was unwilling to part with his stock at a level of prices commensurate with the drop in the dividends. On Wednesday, Mr. Richards offered, by order of the Directors, £19,100 of perpetual 4 per cent. debenture stock of the West Ham Gas Company, to be created under the provisions of the Company's Act of 1889. The progress of the business has been remarkable. Ten years ago, the annual consumption was 688⅓ million cubic feet; whereas last year it was 1158 millions. The stock was put up in 191 lots of £100 each, and they were sold as follows: 5 at £102 10s., 62 at £101 15s., 28 at £101 10s., 2 at £101 5s., and 94 at £101. In accordance with the announcement which has lately appeared in the "JOURNAL," Mr. Atkinson Gibson last Thursday offered for sale, at the Queen's Hotel, Sunderland, sufficient 5 per cent. stock of the Sunderland and South Shields Water Company to produce £24,400. It was put up in £100 lots, which fetched prices ranging from £124 up to £126 apiece.

ELECTRIC LIGHTING NOTES.

Proposed Extensions Vetoed at Newcastle.

A significant step was taken last week by the Newcastle City Lighting Committee, when they decided to keep in use the 200 lamps now lighted by electricity, but not to increase the number. The question of lighting the Swing Bridge by electricity was allowed to stand over. With regard to the lighting of the main streets of the city with electricity, it was mentioned that it would take 660 arc lamps to complete the lighting of the tramway route. This would mean a cost of about £12,000 per annum. These additional arc lamps would displace 926 gas-lamps, at a cost of £2384 per annum. The Committee therefore thought that the cost of lighting the whole of the tramway route with the electric light was too much, and that it would be better at present not to further extend the electric lighting. It was also thought that the Tramway Committee ought to charge the Lighting Committee less for electricity than they do now. In view of the startling figures quoted, it is hardly surprising that the Committee should have come to this conclusion, however much some of the members may have desired to see the electric lighting extended.

PARKINSON'S

CROWN

COOKERS.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*),
COTTAGE LANE, CITY ROAD, LONDON.
BELL BARN ROAD, BIRMINGHAM.

Electric Lighting "Luxuries" at Yarmouth.

At the last quarterly meeting of the Yarmouth Town Council, Mr. G. T. Brown called attention to a payment by the Technical Education Committee of a sum of £31 13s. 6d., for the supply of electricity for the quarter. He said the charge in connection with the Isolation Hospital was £190 for the year; and then there was the cost of the light supplied to the Fishwharf Master's house. The latter seemed to him perhaps the most glaring case of waste in the whole accounts. It was a very small house, and the cost came to £16 a year. There must either be gross waste, or something wrong with the meter. Mr. Suffling said the Bills Committee noticed the item as being somewhat excessive; but the charge was for the darkest quarter of the year, and so for the twelve months would not be £16. Mr. Brown said he had ascertained from the books that £4 was the average paid per quarter. Alderman T. Green said if the Council had luxuries they must pay for them. They all knew it cost twice as much to light the streets with electricity as it would cost to light them with gas. Why, therefore, Mr. Brown complained about the cost of the light supplied to the Fishwharf Master's house, he could not for the life of him understand. It was the case all through the town. He knew that it cost him for the electric light double what he formerly paid for gas; but if they ran these municipal concerns, they must try to make them pay as best they could. So they paid through the nose for all these things, in order to make them pay.

Bath's Heavy Burden.

The Bath Town Council, as at present constituted, are entitled to the sympathy of the citizens of Bath and of the British public at large, for they are in a most disagreeable position in consequence of the folly perpetrated many years ago by their predecessors in office in purchasing the electric light undertaking from the company who were then carrying it on. It is useless now to bewail that folly. The Committee who have for many years carried on the works have incurred a considerable amount of public censure and denunciation. Some of this they deserved, for the manner in which the accounts have been kept, and also for the statement repeatedly made that the concern was prosperous, was paying its way, and was a valuable asset, when it must have been known that it was a disastrous failure, and a most expensive and troublesome possession, which was causing loss of money every year. But there the censure must cease. They had on their hands a most unremunerative property, which was only saved from still heavier loss by the Lighting Committee, many of whom were members of the Electric Lighting Committee, placing a great number of unnecessary arc lamps throughout the city, for which the ratepayers are charged an exorbitant sum per lamp. The Council are now in a dilemma. The works cannot be carried on without a further large expenditure, which will involve heavy calls upon the rates to provide for interest and sinking fund. On the other hand, they cannot sell the works except at a considerable loss, as nobody will purchase them without an undertaking by the Corporation to continue the arc lamps at a very high rate per lamp; and it is conceived that no such undertaking can be given.

Reigate's Electric Light Undertaking—An Explanation.

Mr. F. E. Barnes, the ex-Mayor of Reigate, has written to "The Times" with reference to the remarks made by Sir George Livesey on the above subject at the recent meeting of the South Metropolitan Gas Company. After referring to the words used, and recapitulating the correspondence which took place on the subject between him and Sir George, he says: "I was not concerned in the origination or promotion of a municipal supply; but when adopted by the Council, I helped to carry out its resolutions. The public were only supplied as from August, 1901. The first year's receipts and expenditure have been duly placed before the Council in sitting, reporters being present. At the Council meeting on Oct. 27, the estimate of expenditure was placed before it. At the Council meeting of Jan. 26, I informed the Council what the revenue had been for the past quarter, and gave my estimate of revenue for the year from Michaelmas, 1902, to 1903, which showed that if it was a public company, although so recently established, it would pay all working expenses, and afford a dividend out of revenue; that we were now at the limit of our supply, and permission must be sought of the Local Government Board to double the plant, which, when completed, would, at the present charge of 7d. per unit for the first hour and 4d. after, produce a revenue sufficient to pay all working expenses, interest, and sinking fund, and return £1000 per annum to the Corporation for the reduction of rates or extensions. . . . There is no antagonism between the Corporation and the local Gas Companies. . . . It may do an injury to the borough if such statements are allowed to pass without contradiction, as they would suggest that the Corporation are parties to wild-cat schemes tending to swell the rates, and thus keep intending inhabitants away. That this borough has had excellent administration is shown by the fact that the general district rate has only, for years past, been from 3s. to 2s. 8d. in the pound, and is more likely to decrease than increase in the future.

Carburetted Water Gas Proposed for Southport.—Mr. Corbet Woodall has been conferring with the Gas Committee of the Southport Corporation, and advises them to make carburetted water gas in the proportion of 30 per cent. of the production of ordinary coal gas. In spite of the strong feeling of the Committee, Mr. Woodall thinks that carburetted water gas is almost as good for cooking as ordinary coal gas. The stoves, however, would require adjusting to suit it. A strong point made by him is that, after being burnt in the ordinary way, the fumes are much more healthy than those from coal gas. An 18½-candle carburetted water gas and coal gas will, he says, carry 8 miles, and then be of 16-candle power; whereas with benzol enrichment it would not carry so far.

BUSINESS PLANS, 1903.

If you wish to increase your Gas Consumption this Year, you cannot do better than

Hire out Gas Cookers.

* * * *

THE

"Eureka"

is the BEST.

CARDIFF CORPORATION WATER SUPPLY.

The Story of Its Progress.

At a recent Meeting of the Cardiff Architects' Society, Mr. C. H. PRIESTLEY, M.Inst.C.E., the Chief Engineer of the water-works of the Corporation, read a paper describing the supply.

Mr. Priestley began by sketching the conditions of the water supply, or rather the want of it, existing in Cardiff 50 years ago, when the population nuumbered between 17,000 and 20,000. He said that in those days water for washing, cleaning, and ordinary domestic purposes was obtained from the canal, the River Taff, or from a few pumps in different parts of the town, some of which were fed from the canal, and others by means of wells sunk through the gravel and marl strata upon which the upper part of the town was situate. The supply, however, was insufficient and uncertain, obtained at considerable inconvenience, and the quality generally much deteriorated by infiltrations through an ill-drained soil. An inquiry was held into the question in 1850, and Mr. Priestley quoted freely from the evidence then given showing the insanitary condition of the wells and the inadequate nature of the supply. In that year, a private Company was formed for water-supply purposes; and it was this Company who constructed the works at Ely and the reservoirs at Penhill, Lisvane, and Cogan. In July, 1878, the Cardiff Corporation bought out the Company for £300,000, representing 25 years' purchase of the net annual revenue.

The present Taff Fawr, or Brecon Beacons, scheme was suggested by Mr. J. A. B. Williams, M.Inst.C.E., the Corporation's Engineer, in 1881. A proposal of such magnitude, said Mr. Priestley, which included the construction of large storage reservoirs situate 30 miles away from Cardiff, with the necessary trunk mains and other works *en route*, raised great discussion in the Council Chamber and in the town; but the Corporation, after consultation with Mr. T. F. La Trobe Bateman, one of the most eminent water-works engineers, finally adopted the recommendations of Mr. Williams, in May, 1883. The Llanishen reservoir, which formed part of the scheme, was thereupon commenced in the spring of 1884, and completed in the autumn of 1886, and an Act of Parliament was obtained, after great opposition, for impounding the waters of the Taff Fawr in Breconshire.

Having, with the aid of plans and diagrams, given a description of the Nos. 1 and 2 reservoirs at Taff Fawr, and the aqueduct connecting the storage reservoirs, passing down the valley of the Taff through Merthyr Tydfil and Pontypridd to Lisvane and Llanishen, a total distance of 32 miles Mr. Priestley went on to say that the Corporation had parliamentary powers to construct another reservoir in the Taff Fawr Valley—being No. 3 of the series—the land for which had already been purchased. This would be the largest of the three, having a capacity up to 900 million gallons; and the town supply would thereby be increased by about 3 million gallons per day. That the time was not far distant when this work would have to be taken in hand was, he said, made apparent during the summer of 1901, when the quantity in store on Aug. 13 fell to 365 million gallons, equal to about six weeks' supply at the rate of summer consumption. Fortunately rain fell earlier that year in the Taff Fawr Valley than in most parts of England, where many of the large centres of population were put to great inconvenience and loss owing to the scarcity of water.

Mr. Priestley went on to explain that the watershed secured by the Corporation in the Taff Fawr Valley was capable of yielding a still further additional quantity for town supply by the construction of more reservoirs whenever the need might arise. The capabilities of the gathering-ground for the collection and storage of water was indicated by the fact that during the past two months upwards of 2000 million gallons passed over the waste weir at Cartreff to the river. Should the population of the town and district be doubled in years to come, there would still be an ample supply of water in the valley to meet all requirements. The Corporation had power to abstract 3 million gallons of water per day from the River Ely, as well as to take the water from the drainage area of 2200 acres at Lisvane and Llanishen, all of which water would be available for trade and sanitary purposes, and might be made use of by means of duplicate mains. Mr. Priestley described the scheme he had recently prepared for utilizing water from the River Ely for street watering, and other sanitary purposes; the idea being to pump the water from the Ely into the Penhill service reservoir, whence it will gravitate through the new mains to be laid throughout the town.

In conclusion, Mr. Priestley said that during the 22 years that the water undertaking had been in the hands of the Corporation, a full and constant supply for domestic use had always been maintained, with the exception of a short time in the very dry summer of 1887, notwithstanding the increase of population from 78,000 to 170,000 during that period. In addition, they supplied a suburban and rural population of 25,000 or 30,000. The total capital expenditure to March 31 last had been £228,000. The revenue up to the end of 1890 had been sufficient to pay all charges for interest and sinking fund as well as working expenses. Since that date, owing to the very large expenditure on new works, it had been necessary to levy a rate in aid, which last year amounted to a little over 2d. in the pound.

WAKEFIELD CORPORATION WATER SUPPLY.

Engineer's Report.

According to the report of the Water-Works Engineer of the Wakefield Corporation (Mr. C. Clemesha Smith, Assoc.M.Inst.C.E.) for the past year, the daily average consumption of water was reduced by 80,000 gallons. As the increase in population and the number of water-closets and baths required an additional 15,000 gallons per day, and the quantity of water sold by meter was 23,000 gallons per day less than during

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.		Cubic Feet Daily.
BLACKBURN	1,250,000	YORK	750,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	ROCHESTER	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	KINGSTON, ONT.	300,000
COLCHESTER	300,000	CRYSTAL PALACE DISTRICT	2,000,000
BIRKENHEAD.	2,250,000	DULUTH, MINN.	300,000
SWINDON (New Swindon Gas Co.)	120,000	CATERHAM	150,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	LEICESTER	2,000,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	ENSCHEDE (HOLLAND)	150,000
HALIFAX	1,000,000	BUENOS AYRES (RIVER PLATE CO.)	700,000
TORONTO	250,000	BURNLEY	1,500,000
OTTAWA.	250,000	KINGSTON-ON-THAMES	1,750,000
LINDSAY (Remodelled)	125,000	ACCRINGTON	500,000
MONTREAL	500,000	TONBRIDGE	300,000
TORONTO (Second Contract Remodelled)	2,000,000	STRETFORD	500,000
BELLEVILLE.	250,000	OLDBURY	300,000
OTTAWA (Second Contract)	250,000	TODMORDEN	500,000
BRANTFORD (Remodelled)	200,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
ST. CATHERINES (Remodelled)	250,000	YORK (Second Contract)	750,000
KINGSTON, PA.	125,000	ROCHESTER (Second Contract)	500,000
PETERBOROUGH, ONT.	250,000	NEWPORT (MON.)	250,000
WILKESBARRE, PA.	750,000	TOKIO, JAPAN.	1,000,000
ST. CATHERINES (Second Contract)	250,000	PERNAMBUCO (Brazil)	125,000
BUFFALO, N.Y.	2,000,000	MALTON	150,000
WINNIPEG, MAN.	500,000	DULUTH, MINN. (Second Contract)	300,000
COLCHESTER (Second Contract)	300,000	BROCKVILLE (ONT.)	250,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,200,000 Cub. Ft. SMETHWICK, 500,000 Cub. Ft. LEICESTER (2nd Cont.), 1,000,000 Cub. Ft.
GRAVESEND, 300,000 C. Ft. NEWPORT, MON. (2nd Cont.), 250,000 C. Ft. TORONTO (3rd Cont.), 750,000 C. Ft.

the previous year, the actual saving (due to detection of waste, closer inspection, and other means) was 72,000 gallons per day. During the past two years, the total saving due to detection and prevention of waste has been 232,000 gallons per day. The average consumption per head within the city, for all supplies other than those by meter, in 1900 reached 25·2 gallons per head; in the same area during the past year, the consumption had been reduced to 19·8 gallons per head, or a reduction of 20 per cent. Tables recording the daily consumption in the years 1898 to 1902 show that in the first-named year the total was 2,539,000 gallons per day, including the city domestic supply and waste, the city meter supply, asylum, and out-districts. In 1902, the total was 2,455,500 gallons, including the existing city supply; that to the out-districts being reduced by the amount taken by the added portion of Alverthorpe. The highest daily consumption in 1902 was 3,165,000 gallons (Sept. 5); and the lowest, 1,569,000 gallons (Easter Monday)—the maximum consumption being double the minimum. The highest weekly consumption was for the week ended Dec. 13, averaging 2,670,000 gallons per day; and the lowest was for the week ended April 5, averaging 2,165,000 gallons per day—the maximum weekly consumption being 23 per cent. more than the minimum. The consumption by meter in the out-districts in 1902 was 397,684,000 gallons—a net increase of 10,613,000 gallons.

The total quantity of water sold by meter in 1902 was 611,589,000 gallons—a decrease of 8,500,000 gallons, or 1·33 per cent., on the previous year, against an increase of 6,500,000 gallons, or 1 per cent., for 1900. The length of mains in the city is 47½ miles; outside the city, 31 miles—total, 78½ miles. During 1902, 476 yards of mains were laid in the city and 28 yards outside; and 14 siphon-valves and 10 fire-plugs were fixed in the city and 2 siphon-valves and 1 air-valve outside. There were 274 yards of 4-inch main, 4 valves, and 2 fire-plugs renewed. In concluding his report, the Engineer says: "During the year the filter-beds at Jaw Hill and the service reservoir at Lindale Hill were brought into use. Early in October, treatment with chalk and lime was substituted for the soda process for the prevention of action upon lead, with satisfactory results; the Analyst's reports showing that the action upon lead is well within the limits of safety. Up to the present time, the cost of the new process has been at the rate of £250 per annum. The cost of the soda process prior to the construction of the filter-beds was approximately £900 per annum."

Water Charges at Wallasey.—A short time ago, a Local Government Board inquiry was held at Egremont, into an application of the Wallasey Urban District Council for a Provisional Order to amend the Wallasey Improvement Acts, 1858 and 1864, so as to increase the maximum percentage of the water-rent for domestic purposes (see "JOURNAL" for Nov. 25, p. 1424). In spite of the strong opposition which was offered to the proposal, the Local Government Board have intimated their intention to issue the Order asked for, which will enable the Council to charge a maximum of 10 per cent. upon the assessable value of premises within the district for domestic water supplies.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Falkirk Town Council on Monday discussed at great length the report of the Special Committee upon the subject of gas supply, the gist of which I was able to give last week; and by a majority of two they adopted it. Several weeks ago I mentioned that the Special Committee had submitted a series of questions to the Manager (Mr. James Kincaid), some of which, at least, were of an impertinent nature; and that, after receiving Mr. Kincaid's replies, they sent the queries back to him to answer in another way. Mr. Kincaid's replies are given in the report. They would, however, occupy too much space, and so I give portions of them only, omitting such parts as consist of figures as to the number of retorts working, and the like. Mr. Kincaid stated that the gasholder at Bleachfield, which is the place known as the Parkhouse site, has no outlet-pipe from it to supply the town direct, so that the gas must be taken back to the works holder by the inlet-pipe. The works holder being heavier than that at Bleachfield, the gas in the outer lift of the latter cannot be taken back until the works holder has uncupped. The inner lift of the Bleachfield holder, being the lightest of all to be utilized, must be turned on to the district without being governed, and can only slightly augment the supply sent to the town from the works. The works holder only contains 215,000 cubic feet. A stoppage in manufacture for two hours in the evening would therefore seriously interrupt the gas supply. Previous to this winter, the maximum daily output was 716,900 cubic feet. This winter it reached 787,500 cubic feet—a 9¾ per cent. increase. To put on an exhauster to draw gas back from Bleachfield would not be practicable under existing arrangements. The gas manufactured at Falkirk amounts to 140 million cubic feet a year, and the area of the gas-works is three-fifths of an acre, with storage room for 7½ days' coal, only half of which is under cover. This represented a congestion unequalled in any gas-works in Scotland. As to enrichment by means of benzol, Mr. Kincaid pointed out that the yield of gas from cannel and shale is greater than from splint, which would be used with benzol. He gave the cost to enrich gas to 21½ candles by cannel and shale at 1s. 1·74d., and by benzol at 1s. 2·10d.—a saving by the former of 0·26d. per 1000 cubic feet. By using about 1400 tons of shale annually, 10 per cent. less coke requires to be stored. The limited coke-yard space, and the increased yield of gas from the retorts, formed arguments for continuing as at present. On the other hand, the gas supply being deficient during the darkest months, the quality of the gas could be improved, to compensate to some extent for the defective supply. Were it considered advisable at any time to increase the illuminating power, benzol would form the readiest method of enrichment. The Special Committee reported that, having made inquiries as to the cost of properties beside the existing gas-works, they found the prices demanded were such that they could not recommend that scheme to

To-Day,

Thousands are
cooking

Pancakes

on
Richmond's
Cookers.

Most Gas Companies

Hire Them.

ADVERTISEMENT OF THE RICHMOND GAS STOVE AND METER COMPANY, LIMITED.

the Council. They considered the Manager's report to them showed that the Gas Committee, in their anxiety to procure new works, had omitted to take full advantage of the capacity of the present ones, which were capable of a considerable increase of the output of gas. The Special Committee were now prepared to accept the recommendation of the Gas Manager as to the necessity for new works. It was therefore the Committee's opinion that the erection of the works should not be longer delayed. They recommended that they be put up at Bleachfield, subject to the approval of Messrs. Black and Strang, of Falkirk, as to foundations; and in order to facilitate the work of these gentlemen, that the Gas Manager should prepare block plans, showing the weights of the different buildings necessary for gas-works, and that Mr. T. Wilson, of Coatbridge, be appointed Consulting Engineer, at a fee of 150 guineas, in the event of the works being proceeded with. As I have said, this report was adopted by the Council. It will be observed that the point of it is that the Special Committee have carried their proposal of reverting to the Parkhouse site, which had been condemned on account of its mossy nature, the impossibility of increasing it, and the difficulty of getting communication with it by road. There are 5 acres of land at Parkhouse; and it is bounded on two sides by railways, and on the third side of the triangle by a canal. It is difficult to say what may now happen in the matter, because the Council have changed their opinions so often upon this subject. If the gentlemen who are to report as to suitability for foundations should be unfavourable to the site, it will finally go by the board; but it is impossible to say that the Council will return to the Thornhill site, as to which there seems to be a strong antagonistic feeling. It is already announced that Mr. Wilson has declined to accept the position of Consulting Engineer, because of the conditions of the appointment; so that the movers of the Parkhouse site have at once met with a difficulty in carrying their views into effect.

Mr. A. Yuill, of Dundee, has prepared a statement upon the street lighting of the city by means of incandescent gas-lamps. He states that at present there are 3860 ordinary gas-lamps, and 486 incandescent ones. The consumption of gas per hour is 9680 cubic feet in ordinary lamps; and if incandescent lamps consuming 2½ cubic feet of gas each per hour were substituted for these, the gas required would be 10,865 cubic feet per hour. At present the lighting of the tramway routes costs £1745 a year; and with incandescent lamps the cost would be £1920. If 87 principal streets were dealt with, the cost would be raised from £2180 to £2688. For the corners of side streets and lanes, the cost would be increased from £505 to £685; and if the whole of the side streets and lanes were dealt with, the cost would be raised from £4007 to £5056. If the entire lighting of the city were to be converted into the incandescent system, the cost would be raised from £7933 to £9665. To deal with tramway routes alone would involve an extra annual charge of £175. If tramway routes, principal streets, and corners of side streets and lanes were to be dealt with, the increase in the annual cost would be £843; and the annual increase for the whole city would be £1732. The Gas Committee considered Mr. Yuill's statement on Tuesday, and resolved to recommend that meanwhile only the tramway routes should be lighted by incandescent gas-lamps.

Mr. W. Ewing, the Corporation Gas Manager in Greenock, reported to the Town Council this week that during the month of January the quantity of gas made at Inchgreen was 41,678,600 cubic feet—a decrease of 651,100 cubic feet upon the output in January of last year. The average yield of gas per ton of coal was 10,253 cubic feet. The quantity of gas sent out was 41,509,600 cubic feet—a decrease of 801,100 cubic feet upon the quantity in January of last year. The bulk of coal used was 4061 tons, as compared with 4273 tons.

Mr. Paterson, the chief officer of the Fire Brigade in Glasgow, reports that in 1902 there were 716 fires within the city, involving losses to the amount of £189,000. Fourteen of the fires were due to defective electric light fittings, and the greater number of these arose through the close proximity of the fittings to gas-pipes made of soft metal.

The Water Committee of the Glasgow Town Council this week recommended that they be authorized to advertise for a Water Engineer to succeed Mr. J. M. Gale, who has resigned the post, and that the salary to be offered should not exceed £800 a year. It was moved that the subject be reconsidered by the Committee, with a view to their satisfying themselves whether they could not give the appointment to one of their own assistants, at a less salary than £800. It was also proposed that £1000 be offered, in order that the best man possible might be obtained. The latter motion was made upon the ground that in a few years the Corporation will have to tackle a very big water scheme. There was a long talk upon the subject, in which the prevailing feeling was distinctly in favour of one of the present assistants being appointed, in support of which it was stated by more than one speaker that the assistants have been carrying on the work for some years, and that no mistakes have been made by them. The Council, by a large majority, adopted the recommendation of the Committee.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 21.

Sulphate of Ammonia.

There being large colonial orders to place, the market has recovered from the quieter tone observed at the end of last week. Prices have, however, been somewhat irregular, for while makers have been able to obtain full prices, there has been reselling at a discount. The closing quotations are £12 11s. 3d. per ton f.o.b. Hull, and £12 12s. 6d. per ton f.o.b. Liverpool. Supplies have been scarce at Leith, and £12 15s. is quoted there. For near months there have been sales at about the level of spot prices. For April-September and July-December there is not much interest, but makers' ideas are unchanged.

Nitrate of Soda.

This is steady at 9s. 1½d. to 9s. 3d. per cwt., according to quality,

THE

MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

PREVENTS NAPHTHALENE DEPOSITS.

OVER 100 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

Among the Companies and Towns supplied are The Gas Light and Coke Company, The South Metropolitan Gas Company, Birmingham, Leeds, Rochdale, Bristol, Sheffield, Southport, Alloa, Broughty Ferry, Dunfermline, and many other Works, both large and small, where they have been working in some instances for the past Seven Years.

MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.

For Prices and full Particulars, apply to

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

on spot. Notwithstanding heavy deliveries, both on the Continent and from U. K. ports, holders have not been able to achieve an advance in prices.

LONDON, *Feb.* 21.

Tar Products.

The markets are quiet all round; and there is really very little fresh business to report. Pitch is decidedly quiet; and there is more disposition to sell on the part of manufacturers, probably owing to the fact that certain tar contracts have been secured; and this makes distillers anxious to take advantage of the present high prices ruling for pitch. There is a good inquiry for September-December; but buyers' ideas of value for this period are certainly less than the prices now ruling for prompt. Benzol is quiet. An offer of 9½d. f.o.b. London was refused for March-April; makers asking 10d., which buyers decline to pay. In 50-90 per cent., the market is again quiet. There are sellers at 8½d. for prompt, but at present consumers will not pay more than 8d. As regards toluol, there is rather more inquiry. An offer of 7½d. for March-December was declined by London refiners, who were not prepared to sell so far forward, except at an advance on existing prices. The position of anthracene remains unchanged, but there is perhaps a little more inquiry for forward delivery. In solvent, a little business has been doing for home consumption, but only in special qualities. There is absolutely no Continental demand. Crude carbolic is still very depressed, and 1s. 6d. has again been accepted for 60's for export. In crystals, the market remains steady. There is a slightly improved demand, especially for the French markets. Creosote is quiet. There is more offering, and consumers do not care to purchase, especially for early delivery. In London, there has been a little more inquiry for export; but in the North the quantities offering appear to be rather large just at present.

The average values during the week were: Tar, 22s. 6d. to 27s. Pitch, London, 58s. to 60s.; east coast, 56s. to 57s. 6d.; west coast, 55s. to 55s. 6d. Benzol, 90 per cent., 9½d. to 9⅝d.; 50-90 per cent., 8d. to 8½d. Toluol, 7d. to 7½d. Crude naphtha, 3½d.; solvent naphtha, 8½d. to 9½d.; heavy naphtha, 9d. to 10d. Creosote, London, 1½d. to 1⅝d.; North, 1¼d. to 1⅜d. Heavy oils, 2d. to 2⅛d. Carbolic acid, 60 per cent., 1s. 6d. to 1s. 6¼d. Naphthalene, 35s. to 55s.; salts, 25s. to 27s. 6d. Anthracene, "A" quality, 1½d. to 1¾d.; "B" quality, 1d. nominal.

Sulphate of Ammonia.

The market continues very firm; and there is practically no change in prices. The Gaslight and Coke Company are nominally quoting £12 15s. for March, but are not anxious to sell. They would probably accept £12 10s. for March-April, and £12 7s. 6d. for May-September. Another large London Company report business at £12 12s. 6d. for prompt, and are still sellers at this price for March. In Hull, there is a fair business doing at £12 8s. 9d. to £12 10s. for prompt; but there is not quite so much inquiry for forward delivery from this port. In Leith, makers are very firm; but there is little business to report. Buyers do not seem so anxious for early delivery, while makers continue firm in their ideas. In Liverpool, business appears to be very limited, but small sales are reported at from £12 10s. to £12 11s. 3d. for early delivery.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The unsatisfactory position reported in the coal trade of this district last week remains without improvement. If there is any change at all, it is in the direction of increasing supplies on the market and weakening prices. The continued exceptional mildness of the season is so largely restricting requirements for house-fire consumption that, even with collieries not running more than an average of 4 to 5 days per week, it is becoming increasingly difficult to get rid of the restricted output. In the Lancashire and surrounding districts, large quantities of coal are reported to be lying under load on the pit sidings; and to effect clearances low quotations are being made, which although at present only temporary, and not affecting the general list basis, are more than likely to become permanent unless there is some material change in present conditions. At the pit mouth, best Wigan Arley ranges from about 14s. 6d. up to 15s. 6d. per ton, the common sorts of Arley and Pemberton 4 feet from 12s. and 12s. 6d. up to 13s., and common house-fire coals from about 10s. to 11s. per ton. The restricted demand for house-fire consumption is throwing an extra quantity of the lower qualities of round coal on the market; and as the requirements for iron making, steam, and general manufacturing purposes remain only moderate, supplies are in excess of the demand, and prices barely maintained at late rates. At the pit mouth, ordinary qualities of steam coal could be bought from 8s. to 8s. 6d per ton, with the better descriptions quoted about 9s. to 9s. 3d. The lessened quantity of round coal just now being screened is necessarily tending to curtail the production of slack, and supplies of engine fuel are not over plentiful on the market, with prices well maintained at late rates and a tendency towards increasing firmness. At the pit mouth, best Lancashire slack remains firm at about 6s. 6d. to 7s. per ton, medium sorts are quoted at 5s. 6d. to 6s., and the commoner slacks from 4s. 3d. to 4s. 9d. The better qualities of steam coal scarcely average more than 10s. to 10s. 3d., and for special clearance sales 9s. 6d. is being taken for delivery at the ports on the Mersey.

Northern Coal Trade.

There is further ease in the coal trade of the North-east, because of the lessened demand from the United States, which gave such activity to the steam coal trade in the past two months. A few cargoes are still being sent to that country; but the demand is only limited. Naturally, there is an ease in the prices of steam coals; best Northumbrian steams being about 10s. 9d. per ton f.o.b., second-class steams 9s. 6d. to 9s. 9d., and steam smalls are still rather scarce at 5s. 9d. There is fair, but barely full, employment at the more northern of the

NEW SLOT-COOKERS

THE BEST MADE.

FIXED OR LOOSE BURNERS TO ORDER.

THE "MAIN" SERIES.

IN FOUR SIZES.

PRICES ON APPLICATION.

R. & A. MAIN, LD.,

LONDON: 214, ST. JOHN ST., E.C. & GLASGOW: 26, WEST NILE ST.

local collieries. In the gas coal trade, the settlement of some of the Swedish contracts shows that prices abroad are lower; but this is in some quarters credited to lower freights, which do in some cases rule. The price of best Durham gas coals, for occasional sales, is now put lower—at about 9s. 3d. per ton f.o.b.; but the great bulk of the deliveries are on the long contracts, and some interest is beginning to be felt as to the prices that will rule for the renewal of these. Gas coke is easier, as far as the export prices are concerned—12s. 6d. to 13s. per ton f.o.b. having been quoted in Newcastle in the last few days.

Scotch Coal Trade.

The market keeps steady, and there has been a good deal of inquiry for coal for delivery during the year. Prices have not varied. They are quoted at: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 9s. 6d. to 10s. 3d., and splint 10s. 6d. to 10s. 9d. The shipments for the week amounted to 216,887 tons—an increase of 6297 tons upon the preceding week, and of 34,347 tons upon the corresponding week of last year. For the year to date, the total shipments have been 1,149,961 tons—an increase of 56,640 tons upon the same period of last year.

Successful Assessment Appeal at Bradford.—Owing to a large increase in the assessment of the Bradford Corporation gas-works, the Gas Committee instructed Messrs. Thomas Newbigging and Son to value the undertaking for rating purposes. Mr. Charles Wood (the Gas Engineer and Manager to the Corporation) and Mr. William Newbigging attended a recent meeting of the Assessment Committee in support of their figures, which were eventually accepted by the Committee, and the rateable value fixed at £27,152.

Water Supply for Denton (Northants).—The first section of the water scheme of the Denton Parish Council has just been opened. Land was acquired from Lord Northampton, and two reservoirs have been built upon it. The water, of which there is to be a good supply, is to be pumped from a well in close proximity, by "Hercules" water-motors; and a 3-inch main has been laid. Messrs. E. & H. Roberts were contractors for the works, and, with Mr. Smart, who did most of the construction, they have given great satisfaction.

The Walker and Wallsend Gas Bill.—A deputation from the Walker and Wallsend Gas Company have had an interview with the Estate and Property Committee of the Newcastle Corporation, to see if terms could be come to respecting the Company's application to Parliament for powers to acquire additional land, in order to enlarge the gas-works and to lay down a railway into the works. The Committee, however, pointed out that the Corporation could not agree to the terms as set out in the Bill; and the representatives of the Company thereupon promised to send amended particulars. On receipt of these, a special meeting of the Committee will be convened to consider them.

City of St. Petersburgh New Water-Works Company, Limited.—At the meeting of this Company yesterday, the Directors reported a sum of £5875 as the net profit for the past year. An interim dividend of 5s. per share was paid in September last; and they recommended that a further dividend of 5s. 6d. per share should be paid; that £500 should be placed to the reserve fund; and that the balance (£229 16s.) should be carried forward. During the past year, a sum of £7696 17s. 6d. of "B" debentures was paid off.

Water Scheme for Rishworth.—A meeting of ratepayers in the Rishworth district, called at the instance of the Rishworth District Council, was held last Tuesday, to consider an offer made by Lord Savile, through his agent (Mr. W. Lipscombe), which would secure to the district a supply of water. Mr. R. E. Horsfall gave particulars of the scheme. He said Lord Savile's agent made them an offer of the Rishworth Lodge supply. If this were insufficient, they could cut further trenches on the moor which would increase it. They had cut trenches, and with these and the Rishworth Lodge supply they would secure 14,000 gallons per day. He estimated that they would require daily for domestic purposes 6000 gallons, and for trade purposes 2000 gallons. A total length of 2½ miles of cast-iron pipes would be required. It could be arranged that they could put in the pipe-lines, and leave over the construction of a reservoir by having temporarily a wooden cistern. The cost of the project would be about £2000. The scheme was approved by a large majority of those present.

Quality of the Gosport Water Supply.—As has already been stated in the "JOURNAL," the quality of the water supplied by the Gosport Water Company is at the present time greatly exercising the minds of the inhabitants. At the last meeting of the Urban District Council, the Chairman (Mr. J. H. F. Treacher) stated that the Company had already placed at the top of their well more than £1000 worth of machinery, in order to secure a purer supply of water. He was informed that the source of the salinity of the well had been traced, and that it had been strictly localized within a very small area at one end of a heading going towards Fareham Creek. Slight fissures were discovered, which allowed of the percolation of salt water into the well. The Company had arranged to stop up the greater portion of this heading; and as the other headings were themselves pure, they should, as sensible men, give the Company a chance to carry out the work they had in hand. In answer to a question, he admitted that the Foxbury well (which had been complained of) had not been closed. After a long discussion, it was decided to appoint a Special Committee to consider, investigate, and report as to the probability of the Foxbury water being rendered satisfactory, so as to provide a sufficient and good supply at an early date. The Chairman remarked that long before they could get water from Portsmouth, he hoped their own would be right. Another member, however, stated that the Admiralty had altered the source of their supply, and presently they would change the Marines' supply.

GASHOLDERS WITH GUIDE-FRAMING, OR SPIRAL GUIDES ONLY.

PURIFIERS WATER LUTES OR LUTELESS, WITH SPECIAL RUBBER JOINT.

MILBOURNE'S PATENT LUTELESS PURIFIERS.

WECK'S PATENT CENTRE-VALVE.

WATER - **CONDENSERS** - ATMOSPHERIC

Milbourne's Patent Grid Valve. Cripp's Patent Grid Valve.

VALVES. *See the new Edition of Walker's Catalogue.*

SULPHATE AND SULPHUR PLANTS. TAR-DISTILLING PLANTS.

SIEVES. SELF-SEALING MOUTHPIECES. TAR-BURNERS.

C. & W. WALKER, Ltd.,

Midland Iron-Works, Donnington, nr. Newport, Shropshire.

110 CANNON STREET, LONDON, E.C.

Telegraphic Addresses: "FORTRESS, DONNINGTON, SALOP." "FORTRESS, LONDON."
Codes used A.B.C. and "A1."
Telephone No. 12, WELLINGTON, SALOP.

Extension of the Ferndale (Glam.) Gas-Works.—During the past year, the works of this Company have been much improved and extended by the provision of new purifiers, washer-scrubber and exhauster, and the addition of a lift to the larger holder, from the designs and under the superintendence of the Company's Engineers, Messrs. Thomas Newbigging and Son.

Suicide by Coal Gas.—Oliver Rogers, a seaman, adopted an extraordinary method of ending his life at Southampton last Thursday. He put three pennies into a slot gas-meter, and then fixed a long piece of india-rubber tubing to a burner. Turning on the gas, he placed over his head a pillow-slip, into which he put the end of the tube. Then, lying on the bed, he allowed himself to be slowly suffocated. He was dead when discovered. At the Coroner's inquiry, it transpired that an accident had incapacitated him, and this had preyed on his mind. The Jury returned a verdict of "Suicide during temporary insanity."

Reductions in Price.—In view of the favourable contracts obtained by the Cheltenham Gas Company for coal, the Directors have announced a reduction of 1d. per 1000 cubic feet in the price of gas; making it 2s. 5d., less 5 per cent. discount for prompt payment. The reduction will take effect from the reading of the indices next month. The Directors of the Bristol Gas Company have just placed all their customers on the same level by bringing the price of 2s. 5d. per 1000 cubic feet hitherto charged in the out-districts down to 2s. 3d., the figure general in the city. They are also making a concession with reference to the charges for gas used for motive power. Formerly the users of gas-engines had to take a minimum quantity of a million cubic feet before getting the advantage of the reduced charge of 2s. 1d. per 1000 cubic feet; but now it is intended to make this the price for all gas used in the production of power. These reductions, it may be fully expected, will lead to increased consumption. At the present time only one-third of the houses in Bristol are supplied with gas; so that there is plenty of room for an extension of business. The slot meter is steadily making way in the homes of the working classes.

Worksop Water Purchase Question.—With reference to the inquiry which was held at Worksop last December regarding the desire of the Urban District Council to acquire the undertaking of the local Water Company, the following letter from the Local Government Board, refusing sanction to the scheme, has been received by the Clerk: "Dear Sir,—I am directed by the Local Government Board to state that they have had under consideration the report made by their Inspector (Mr. Pottinger), after the inquiry held by him with reference to the application of the Urban District Council of Worksop for sanction to the purchase by them of the undertaking of the Worksop Water-Works Company. This Board find that the annual assessable value of the district is only about £52,000, and that the existing debt already nearly equals the assessable value. Looking to this, and to the price which the Urban District Council are likely to be called upon to pay for the water-works undertaking if purchased by them, the Board do not consider that they could properly give their sanction to the purchase.—Noel T. Kershaw, Assistant Secretary." The Council have referred the letter to the Water Committee for consideration.

Irthlingborough Water Supply.—The Irthlingborough Urban District Council have applied to the Local Government Board for sanction to borrow £12,000 for purposes of water supply, including the construction of a reservoir to hold about 100,000 gallons. In connection therewith, Colonel A. J. Hepper, R.E., recently held an inquiry in the town. Mr. H. R. Sharman, the Clerk to the Wellingborough Board of Guardians, stated that the present water supply was insufficient and unsatisfactory, being obtained from shallow wells. Mr. Beeby Thompson advised the Council to sink a well on land at the Wellingborough end of the town. This was done, and the well completed in 1900, and the pumping operations showed that 100,000 gallons of water per day could be obtained. Subsequently, the Council found it necessary to undertake a complete scheme of water supply, and they therefore decided to purchase about 9½ acres of land at a cost of £2000. The assessable value of the parish was £11,406. Mr. J. Waugh, the Engineer to the Council, explained the scheme in detail. He said 100,000 gallons of water would be derived in ten hours, and the whole population would be supplied; giving no less than 20 gallons per head per day. There was no real opposition.

The Acetylene Gas (Automatic Generator) Syndicate, Limited, has been registered with a capital of £1000, in £1 shares, to carry on the business chiefly indicated by the title.

The Chesterfield Gas and Water Board have placed the order with Messrs. R. Dempster and Sons, Limited, of Elland, for resetting three groups of inclined retorts. It is often claimed that inclined settings do not last so long as those set on the horizontal principle. Engineers will be interested to learn that the Chesterfield settings now being renewed have gone for five winters.

Messrs. J. Firth Blakeley and Co., of Dewsbury, are at present erecting a steel tank, 22 feet square by 10 ft. 6 in. deep, on girders and pillars, in connection with the Didcot Urban District Council water supply scheme. The tank is constructed of ⅜-inch bottom plates and ⅜-inch side plates, with bent corners and bottom plates, stays, roofing, &c. complete. In addition to this, the firm are supplying four purifiers 11 ft. by 8 ft. by 4 ft. 6 in. deep, with 10-inch centre-valve and connections, lifting gear, &c., to the Staveley Gas Company, Derbyshire, as well as a set of wrought-iron annular condensers and a rotary washer-scrubber to the Bangor Gas Company, Ireland.

Mr. Alfred Colson is determined not to allow the gas he supplies to the Leicester consumers to bear all the blame for the poor light of which there has been complaint lately. He has had reprinted, in neat pamphlet form, the interview with the representative of the "Leicester Daily Post" referred to in the "JOURNAL" for the 27th ult., press comments thereon, and the letter of Mr. Hincks in which he recorded the surprising effects of a change of burners at the club of the Amalgamated Society of Engineers (*ante*, p. 358). The facts brought forward by Mr. Colson cannot be too often emphasized; and he has done it in a very neatly printed *brochure*, which is less likely to be laid aside than the large sheet previously distributed.

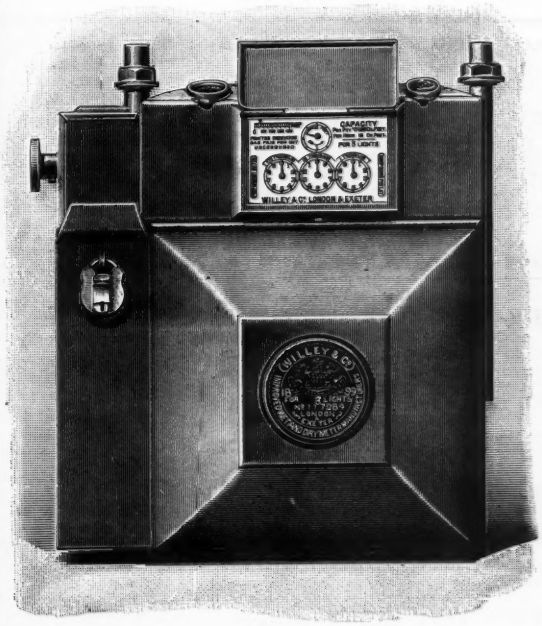
THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and Cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest, and most Accurate yet devised.



ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & CO., LONDON AND EXETER.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

CLERK IN GAS-WORKS. No. 3 99.
CONSULTING GAS ENGINEER. Clonmel. March 7.
GENERAL FITTER. Glyncorrwg Gas and Water Department. March 9.
MANAGER. Harwich Gas Company. Feb. 28.
MANAGER. Hebden Bridge. Feb. 28.
MANAGER. Horncastle Gas Department. March 4.
MECHANIC AND SMITH. No 3983.
TAR DISTILLER. Halifax Gas Department. March 4.
WORKING FOREMAN. Swadlincote. Feb. 24.

Situation Wanted.

TRAVELLER GAS-STOVE TRADE. W. W., Faversham.

Plant, &c. (Second-Hand) for Sale.

CONDENSER. Redditch Gas-Works.
EXHAUSTER AND ENGINE (combined). No. 3987.
GOVERNOR (6-inch). Pontifex and Co., London.

Plant (Second-Hand) Wanted.

PURIFIERS, VALVES, AND EXHAUSTER. No. 4 00.

Meetings of Companies.

BROMLEY GAS COMPANY. Feb. 26.
CAGLIARI GAS AND WATER COMPANY. March 3.
HORNSEY GAS COMPANY. March 13.

Loan Wanted.

WORTHING GAS COMPANY.

Shares Wanted in C. & W. Walker, Ltd., No. 3993.

TENDERS FOR

Ammoniacal Liquor.

HAWORTH GAS DEPARTMENT. Tenders by Feb. 26.
PADIHAM GAS DEPARTMENT. Tenders by March 4.

Coal and Cannel.

SALFORD GAS DEPARTMENT. Tenders by March 19.

Gasholder Tank.

BRIDGE OF WEIR GAS COMPANY.

Gasholders.

BRIDGE OF WEIR GAS COMPANY.
COPENHAGEN. Tenders by April 7.

Governors.

WARRINGTON GAS DEPARTMENT. Tenders by March 5.

Sulphuric Acid.

ISLE OF THANET GAS COMPANY. Tenders by Feb. 26.

Tar.

EXETER GAS COMPANY. Tenders by March 11.
HAWORTH GAS DEPARTMENT. Tenders by Feb. 26.
PADIHAM GAS DEPARTMENT. Tenders by March 4.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in Advance. If credit is taken, the charge is 25s. a year.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON HOUSE,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications RE OXIDE to the COMPANY as above.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for GAS-WORKS.

ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

GAS TAR wanted.

BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD

HYDRATED OXIDE OF IRON

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA

SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.

For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."

Largest Practice and most Up-to-Date Works in Britain.

JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

STREET AND SHOP LAMPS AND LANTERNS.

MARK DUFFIELD & SONS (Established 200 Years), makers of Street and Shop Lamps to own Pattern and Design. Any description of Lamp made. Inquiries invited.

London Manager: EDWARD PADFIELD, West India House, 96 & 98, LEADENHALL STREET, E.C.

Telegraphic Address: "EUPATHY, LONDON."

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

DUTCH OXIDE OF IRON.

EERSTE Hollandsche Yzererts Maaty
(First Dutch Bog Ore Company, Ltd.),
ROTTERDAM.

General Manager for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.

London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.

General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

BROTHERTON & CO., LIMITED.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

PATENTS AND TRADE MARKS

PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.

MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 248 Holborn.

IT is worth your while to buy direct.

THE RELIANCE LUBRICATING OIL COMPANY 19 and 20, Water Lane, Great Tower Street, London, E.C., handle all kinds of Lubricating Oils, for Engines, Cylinders, Dynamos, Spindles, &c., Burning Oils, Solar Distillates, Carburetting Oils, and Spirits for Gas Making; Motor Oils, Fuel Oils, Animal, Fish, and Vegetable Oils, &c., for all purposes. Write for our "Trade Mark" Inkstand, sent free to customers. Non-customers, 2s. 6d. each. RELIANCE LUBRICATING OIL COMPANY, London, Glasgow, Newcastle-on-Tyne, &c. Established 1858. Telegraphic Address: "Subastral," London; A.B.C. Code used. Telephone No.: Avenue 5891.

SULPHURIC ACID for Sale.

BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.

Telegrams: "ENAMEL." National Telephone 1759.

COAL GAS TAR wanted.

Gas Managers in Gloucester, Somerset, Worcester, Devon, Wilts, Hereford, Monmouth, and Glamorgan PLEASE NOTE. BEST PRICE offered either on Fixed or Sliding-Scale Basis.

State Quantity to offer for Prompt and Forward Delivery.

The SHARPNESS CHEMICAL COMPANY, Tar Distillers, Sharpness Docks, GLOS.

OXIDE OF IRON.

FIRE CEMENT, PAINT, GAS COAL.

BALE & CHURCH, 5, CROOKED LANE, LONDON, E.C.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.

SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.

Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

DEPARTMENTAL ASSISTANT FOREMAN.

THIS appointment has now been made, and the Advertiser (No. 3984) desires to THANK those who applied.

TRAVELLER, with good connection in South Eastern Counties, lately representing good Firm, desires re-engagement. Excellent References. Age 27.

Address W. W., 83, Preston Street, FAVERSHAM.

GLYNCORRWG URBAN DISTRICT COUNCIL.

THE above Council invite Applications from competent persons for the appointment of GENERAL FITTER for their Gas and Water Works.

The duties will include the laying and jointing of Mains, Gas and Water Services, Fixing Gas-Meters, and General Fitting and Plumbing Work. Salary 32s. per week.

Applications, stating Age and previous Experience, together with *copies* of Three recent Testimonials, to be sent to us by the 9th of March next.

CUTHBERTSON AND POWELL,
Clerks to the Council.

58, Water Street, Neath,
Feb. 16, 1903.

MECHANIC and Smith wanted, at once. Permanent Situation to good man (Birmingham District).
Apply, by letter, stating all Particulars, to No. 3983, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Clerk for Country Gas-Works, about 60 Miles from London. Wages 22s. per week to commence.
Apply, by letter, stating Age and Experience, to No. 3999, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CONSULTING GAS ENGINEER.

WANTED, a Qualified Gentleman to inquire into and examine the Clonmel Gas-Works, and to report thereon to the Gas Committee of the Clonmel Corporation. The engagement might lead to a permanent appointment.
Applications, stating Terms and Qualifications, to be sent to Thomas Phelan, Esq., Chairman of the Committee, Spring Garden, Clonmel, by the 7th of March, 1903.
Further Information will be supplied upon application to the Secretary.

HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD.

WANTED, a Manager for Gas-Works.
Must have a knowledge of Carburetted Water-Gas Plant, and be a thoroughly practical man.
Make of Gas per annum, about 85 Million cubic feet.
Applicants to state Age, Experience, and Salary required.
Applications to be sent to the undersigned on or before Feb. 28, 1903.

RICHARD CRABTREE,
Clerk to the said Board.
Council Offices, Hebden Bridge,
Feb. 13, 1903.

TO PRACTICAL TAR DISTILLERS.

THE Halifax Corporation are prepared to receive APPLICATIONS from competent practical TAR DISTILLERS to take charge of their Tar-Works.
The salary will be £200 per annum.
Particulars of the duties may be obtained from the undersigned.
Applications, accompanied by *copies* of Testimonials, to be delivered to the undersigned not later than 10 a.m., March 4, 1903, marked "Tar Distiller."

THOS. HOLGATE,
Gas Engineer.
Gas-Works, Halifax,
Feb. 19, 1903.

WANTED, at once, a General Working FOREMAN, who must have full knowledge of the whole routine of Gas-Works, and the working of Generator Settings, and be able to undertake all Repairs and Lay Mains, Services, &c. He must be a thoroughly practical Man, Sober, Steady, and capable of taking entire charge of the Works in the absence of the Manager. Age 25 to 40. Wages to commence at 30s. per week, with House, Gas, and Coal free.
Apply, by letter, with not more than two recent Testimonials, stating present Position and Age, on or before Twelve noon, Feb. 24 next, endorsed "General Foreman," to Mr. G. B. SMEDLEY, Engineer and Manager, Gas-Works, Swadlincote, near BURTON-ON-TRENT.

HARWICH GAS AND COKE COMPANY.

WANTED, by the Harwich Gas and Coke Company, a steady, practical Man as MANAGER, whose Age must not exceed Forty Years. He must be a good Carbonizer, used to Engine and Exhausters, able to take Indices of Meters, lay Mains and Services, have a knowledge of Fitting, and the General Routine of a Gas-Works.
Wages commencing at £2 10s. per week, with House, Gas, and Coal.
Annual make of Gas about 26 Millions, and increasing.
Applications, by letter, stating Age, with not more than Three Testimonials as to Ability and Character, to be sent to the undersigned not later than the 28th day of February.

GEORGE BAINES,
Secretary to the Harwich Gas and Coke Company.
Harwich.

HORNCASTLE URBAN DISTRICT COUNCIL.

GAS-WORKS.

THE Council are prepared to receive APPLICATIONS for the post of MANAGER of their Gas-Works.
Salary £150 per annum, with House, Coals, and Gas.
Applications, in Candidates' own Handwriting, endorsed "Gas Manager," stating Age, Qualifications, and previous Experience, with not less than Three recent Testimonials, must be sent in so as to reach me on or before Wednesday, the 4th day of March next.
The Candidate appointed must give satisfactory security for the discharge of his duties, devote the whole of his time to the work, and will be required to enter on his duties on the 31st day of March next.

H. TWEED,
Deputy Clerk to the Council.
6, Lindsey Court,
Horncastle, Feb. 17, 1903.

SHARES Wanted in C. & W. Walker, Limited.
State whether Preference or Ordinary, and Price required, to No. 3993, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Second-Hand Purifier, 10 ft. square by 4 ft. 6 in. or 5 ft. deep, in good condition, with Valves and Connections, also a good Second-Hand EXHAUSTER, capable of passing 10,000 cubic feet per hour. Prices must be moderate.
Address, with full Particulars, No. 4000, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO BE SOLD—Purifiers, Two or Four, 10 feet square by 4 ft. 6 in. deep, planed Joints, Connections, and Overhead Girders.
Write J. WRIGHT, 181, QUEEN VICTORIA STREET, E.C.

A BARGAIN—Water-Cooled Condenser in perfect condition. Capacity 250,000 cubic feet per 24 Hours.
Address A. E. LAYTON, Gas-Works, REDDITCH.

EXHAUSTER, with Engine combined, 8000 to 15,000 cubic feet per hour, all Connections, by Tangye. In capital order. £90.
Address No. 3987, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SECOND-HAND 6-inch Governor for SALE. Practically new, and in very good condition.
Price to, and Particulars from, S. PONTIFEX AND CO., 17, Coleman Street, LONDON, E.C.

GAS-METERS wanted, old disused Wet. Copper Lamp Frames, Brass, Pewter, Tin, Zinc, Lead Ashes, Old Copper Electric Cable, &c., for Cash.
J. SMITH, Canal Road, BRADFORD.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

THE Haworth Urban District Council are prepared to receive TENDERS for the purchase of surplus TAR and AMMONIACAL LIQUOR, delivered on rails at Haworth Station, for the Year ending March 31, 1904.
Tenders to be sent to the undersigned not later than the 26th inst.

WILLIAM ROBERTSHAW,
Clerk to the Council.
North Street, Keighley.

TENDERS FOR TAR.

THE Directors of the Exeter Gaslight and Coke Company invite TENDERS for their surplus TAR for Twelve Months from the 25th of March next, at per ton of 200 gallons, delivered into Contractor's Tanks at the Company's Works.
Sealed Tenders, endorsed "Tender for Tar," will be received by the undersigned on or before Saturday, the 14th of March next; but the Directors do not bind themselves to accept the highest or any Tender.

By order,
W. A. PADFIELD,
Engineer and Secretary.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of the COAL and CANNEL required at their works during a period of One Year.
Forms of Tender may be obtained on application to Mr. Wm. W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Tenders for Coal," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Three p.m. on Thursday, the 19th of March, 1903.
The Committee do not bind themselves to accept the lowest or any Tender.

L. C. EVANS,
Town Clerk.
Town Hall, Salford,
Feb. 20, 1903.

GASHOLDER.

THE Lighting Department of the Cor- poration of Copenhagen invite TENDERS for the supply and erection of a THREE-LIFT GASHOLDER of 3 Million cubic feet capacity.
Full Particulars and Drawings may be obtained on application to the Engineering Office of the Eastern Gas-Works (Ostre Gasvaerks Tegnestue), Copenhagen.
Tenders, accompanied by the said Drawings, &c., to be delivered to the Director of the Lighting Department, 22, Vestre Boulevard, Copenhagen, not later than April 7, 1903, noon.
The Department will not be bound to accept the lowest or any Tender.

THE LIGHTING DEPARTMENT OF COPENHAGEN.
Feb. 10, 1903.

ISLE OF THANET GAS COMPANY, MARGATE.

TENDERS FOR ACID.

THE Directors of the above Company are prepared to receive TENDERS for the supply of about 225 Tons (more or less) of a good, Brown SULPHURIC ACID, to be delivered from March 1, 1903, to February 28, 1904.
The Acid is to be delivered in tank-waggons to the Company's tank-cart either at the S.E. or L.C.D. Railway at Margate.
Tenders to be addressed to the Chairman, and endorsed "Tender for Acid," and sent in not later than the 26th of February next.
Further Particulars can be obtained on application to the Company's Engineer, Mr. James Dougall.

By order,
THOS. W. FULLER, F.C.I.S.,
Secretary.
Company's Offices, The Dane,
Margate, Feb. 19, 1903.

COUNTY BOROUGH OF WARRINGTON.
(GAS DEPARTMENT.)

THE Gas Committee of the above Borough invite TENDERS for One 12-inch and One 18-inch GOVERNORS.
Full Particulars can be obtained on application to Mr. W. S. Haddock, Gas Engineer.
Endorsed Tenders must be sent in not later than the 5th prox.

FREDK. TAYLOR,
Secretary.
Gas Offices, Warrington,
Feb. 20, 1903.

THE URBAN DISTRICT COUNCIL OF PADIHAM
(GAS DEPARTMENT)

INVITE Tenders for their surplus Tar and LIQUOR for Twelve Months from the 1st of April next.
Sealed Tenders, endorsed "Tar and Liquor," to be sent to the Chairman of the Gas Committee, Council Offices, Padiham, on or before the 4th of March.

By order,
A. J. JACKSON,
Engineer and Manager.
Gas-Works, Padiham,
Feb. 21, 1903.

THE BRIDGE OF WEIR GAS COMPANY, LIMITED.

THE Directors of the above Company are prepared to receive TENDERS for the erection of a GASHOLDER AND STEEL TANK; the Holder to be 58 ft. diameter by 18 ft. deep, and prepared for telescoping. The Tank to be suitable for an outer lift being added.
Further Particulars may be obtained on application to the Manager.
Sealed Tenders, Plans, and Specifications to be sent to Mr. Peter Woodrow, Secretary, Woodholm, Kilmalcolm.

JAS. LAUDER,
Manager.

WORTHING GAS COMPANY.

THE Directors are prepared to Re- BORROW on Mortgage of the Company's undertaking, £2600, bearing Interest at 3½ per cent. per annum, payable Half Yearly.
Lenders to be entitled to repayment at any time on Six Months' notice.
Present Subscribed Stock and Share Capital £74,691.
For further Particulars, apply to

W. FRED. VARRALL,
Secretary.
55, Chapel Road,
Worthing.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the "Bell" Hotel, Bromley, Kent, on Thursday, the 26th day of February, 1903, at Six o'clock p.m. precisely: To receive the Report of the Directors, with the Balance-Sheet certified by the Auditors, to declare a Dividend, to determine the amount of the qualification for Directors and Auditors and their Remuneration, to elect Two Directors and an Auditor on retirements by rotation, and to transact generally the business of a General Meeting.
The TRANSFER BOOKS WILL BE CLOSED from the 11th of February to the 26th of February, both days inclusive.

By order of the Board,
HENRY W. AMOS,
Secretary.
Offices: 156, High Street,
Bromley, Kent, Feb. 11, 1903.

HORNSEY GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Offices of the Company, No. 63, Chancery Lane, in the County of London, on Friday, the 13th day of March, 1903, at Half-past Three o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 31st of December last, to declare Dividends, elect Two Directors and an Auditor, and to transact the Business of an Ordinary General Meeting.
Notice has been received by the Secretary of the intention of a Proprietor to move a Resolution with reference to the remuneration of the Directors.
The TRANSFER BOOKS WILL BE CLOSED from the 28th of February to the 13th of March, both days inclusive.

By order of the Board,
WILLIAM E. ROBERTS,
Secretary.
Offices: 63, Chancery Lane,
London, W.C.

CAGLIARI GAS AND WATER COMPANY, LIMITED.

NOTICE is Hereby Given, that the ORDINARY GENERAL MEETING of the Shareholders of this Company will be held at the Company's Offices, No. 3, Lothbury, in the City of London, on the afternoon of Tuesday, the 3rd day of March, 1903, at Three o'clock, to receive the Report of the Directors, and for the General Business of the Company.
The TRANSFER BOOKS WILL BE CLOSED from the 11th of February to the 3rd day of March, inclusive.

By order of the Directors,
WM. B. PEAT,
Secretary.
3, Lothbury, London, E.C.,
Feb. 21, 1903.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

ATTERTON'S
CHARGING APPARATUS

Nearly 40 of these Machines have been

supplied to English Gas-Works.

Sole Agents for the United Kingdom:

E. PADFIELD & CO.,
96 & 98, LEADENHALL STREET, E.C.
Representatives:
Messrs. BELL & CO., Engineers, CARDIFF,
Mr. J. B. MACDERMOTT, GLASGOW, and
Mr. J. BYRON MACKENNA, DUBLIN.

THE
PETROLEUM GAS SYNDICATE
Are prepared to erect complete Installations (not exceeding 2000 Lights) of their
Petrogene Carburetting Plant,
for Gas Companies, Urban Councils, Gas Engineers, &c., on Co-operative Terms. **Petroleum Gas** is equivalent in Cost of production to **Coal Gas at about 1s. 6d. per 1000 cubic feet,** and is equally suitable for Lighting, Heating, and Power purposes.
Present Lighting System not disturbed during Installation and trial.
For Particulars, apply to
C. E. MASTERMAN, Assoc.M.Inst.C.E.
28, Victoria St., Westminster, London, S.W.

THE
"ROTARY"
STATION METER.
Efficiency Demonstrated.
APPLY—
T. G. MARSH,
MAWSON CHAMBERS, DEANSGATE,
MANCHESTER.

New and Important Work by
Mr. W. J. Dibdin, F.I.C., F.C.S.
Now Ready. 537 pp., Cloth Gilt. Price 21s. net.
With numerous Illustrations, Diagrams, and Tables.
PUBLIC LIGHTING
BY
GAS AND ELECTRICITY
BY
W. J. DIBDIN, F.I.C., F.C.S., &c.
Formerly Chemist and Superintending Gas Examiner to the London County Council.
Author of "The Purification of Sewage and Water," "Lime, Mortar, and Cement," "Practical Photometry," &c.
LONDON: THE SANITARY PUBLISHING COMPANY, LTD., 5, FETTER LANE, E.C.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

THE WIGAN COAL & IRON CO., LIMTD.,
Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.
MIDLAND AND WEST OF ENGLAND DISTRICT OFFICE: *6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.*
Telegraphic Address: "WIGAN, BIRMINGHAM." Telephone No. 200.
LONDON DISTRICT OFFICE: *6, STRAND, LONDON—C. PARKER & SON, Sole Agents.*
Telegraphic Address: "PARKER, LONDON."

"DURA" "DURA"
INCANDESCENT GAS MANTLE
SECOND TO NONE.

UNSHRINKABLE.

The "**DURA**" Mantle is now made of the best 3-ply **Ramie** of English Manufacture.

The "**DURA**" Mantle therefore is of **English** Manufacture throughout.

The "**DURA**" Mantle is sold to the Plumbers, Gas-Fitters, and Retail Ironmongers through the usual Wholesale Houses.

UNEXCELLED.

The "**DURA**" Mantle is Manufactured and sold under License.

The "**DURA**" Mantle is made in all sizes.

The new "DURA" Ramie Mantle is the best for Street-Lighting, and is therefore recommended to Gas Managers.

THE GUARANTY INCANDESCENT MANTLE CO., LTD.,
"DURA" STREATHAM, LONDON, S.W. "DURA"

TROTTER, HAINES, & CORBETT,
LIMITED,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

COKE-BREAKERS,
PRICES REDUCED.
(THOMAS & SOMERVILLE'S PATENT)
With Elevators and Conveyors worked by Steam or Gas Engine.
GEORGE WALLER & CO.
165, QUEEN VICTORIA STREET, E.C.;
And at STROUD, GLOUCESTERSHIRE.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

WELDON MUD
FOR
GAS PURIFICATION,
For use in the
RECOVERY OF SULPHUR,
Also Removal of last Traces of
SULPHURETTED HYDROGEN
in catch position.

Full Particulars on application to the Patentees:
GAS DESULPHURIZATION CO.,
— LIMITED, —
1, FENCHURCH AVENUE, LONDON, E.C.

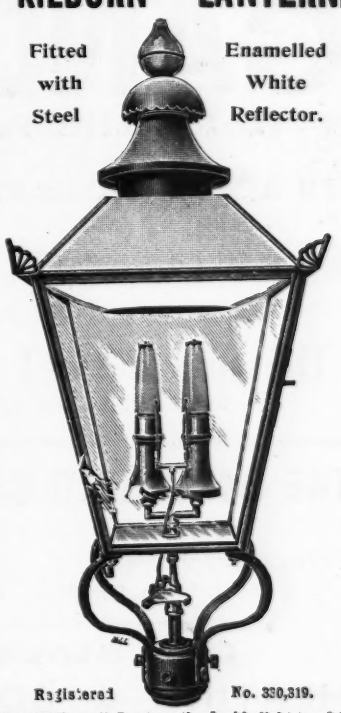
LONDON OFFICE
181
QUEEN VICTORIA ST.
E. C.
DRAKES
HORIZONTAL
AND
INCLINED
RETORT SETTINGS
WITH
GENERATOR
AND
REGENERATOR
FURNACES
LIMITED
CONTRACTORS
FOR
EVERY KIND
OF
GASWORKS
PLANT.
ELEVATORS
AND
CONVEYORS
HALIFAX
AND
LEEDS

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.
For Particulars Price, &c., apply to Mr. EDWARD PRICE, "Langley," Wyke Avenue, WORTHING.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
THE GRASSMOOR CO., LD.,
CHESTERFIELD.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

THE
"KILBURN" LANTERN.
Fitted with Steel
Enamelled White Reflector.

Registered No. 320,319.
The "Kilburn" Lantern (for double lights) and the "St. Albans" Lantern have been adopted for lighting the Town of St. Helens.

H. GREENE & SONS, Limited,
Surrey Engineering Works,
Blackfriars Road, LONDON.
Telephone 1693 HOP.
Telegrams: "LUMINOSITY LONDON."

HISLOP'S PATENT RETORT SETTINGS

THE RESULTS GUARANTEED ARE CERTIFIED
TO EXCEED THAT OF ANY OTHER SYSTEM.

R. & G. HISLOP,
Gas Engineers and Contractors,
13, ST. JAMES PLACE,
PAISLEY.

GANDY'S BELTING

Holds the World's Record! 41 Prize Awards!

IN A WATER-GAS PLANT, an important item is the Belt for driving the Blower.

We have recently had most gratifying success with our specially constructed endless Belts on most difficult Blower Drives, and beg to solicit enquiries from Gas-Works Managers respecting same, to which we shall give full and frank replies.

THE GANDY BELT MANUFACTURING COMPANY, LTD.,
HEAD OFFICES AND WORKS—**SEACOMBE, LIVERPOOL.**

This Trade Mark may be seen stencilled on every genuine "Gandy" Belt.

THE HOUSEHOLD GAS HEATER & COOKER (PARENT) COMPANY, LTD.

(ROSS SYSTEM).

Perfect Combustion.
No Smell. Great Heat.

Gas Stoves,
HEATING & COOKING.
Invaluable for Sick Room. No Flues.

LIBERAL DISCOUNTS to the Trade.

Telephone No. 5260 CENTRAL.

Recommended by the
Medical Profession.

THE KING OF HEATERS.

THE CONSUMPTION OF GAS UNDER ONE FARTHING AN HOUR.

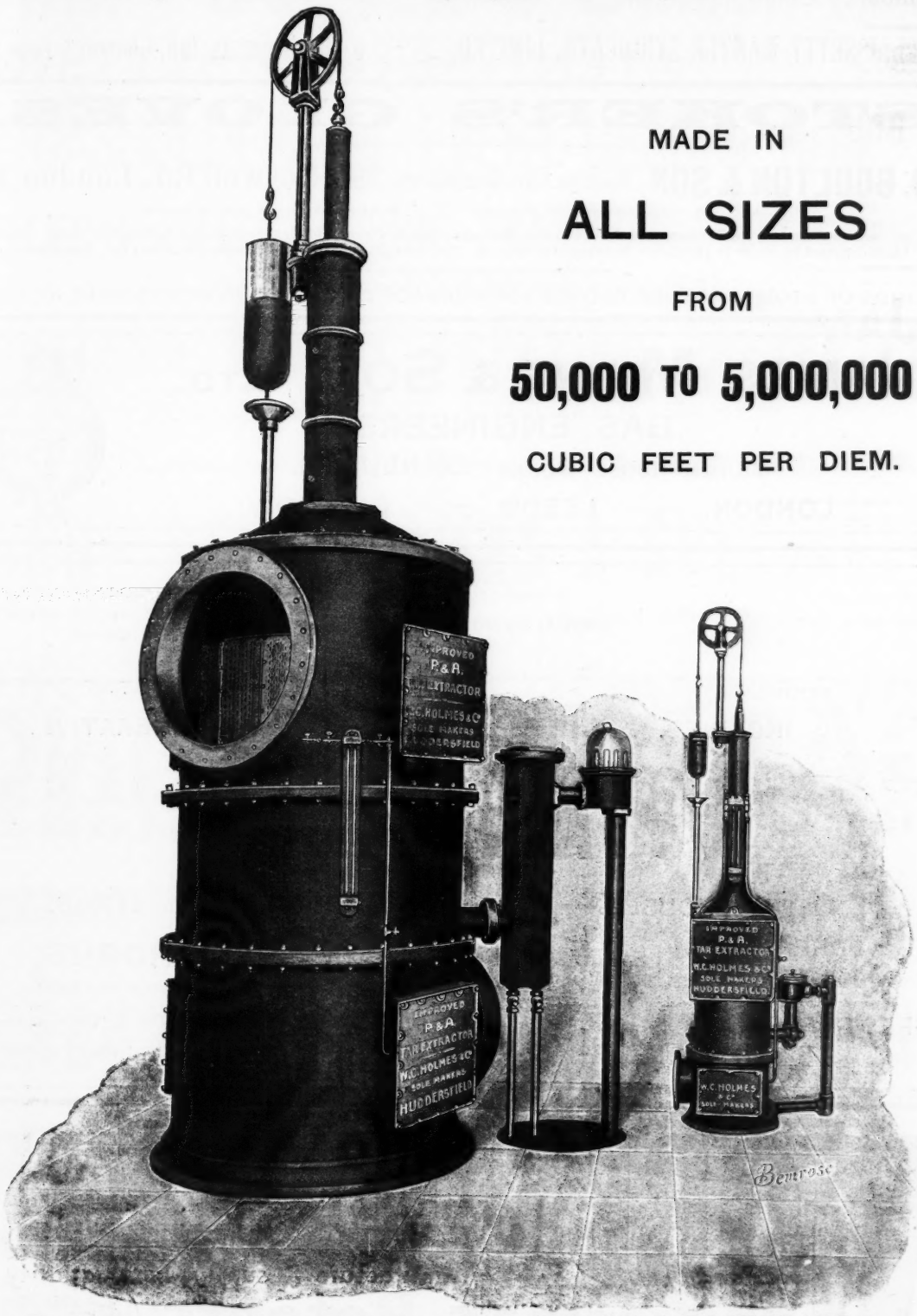
For Particulars apply to the Secretary.

Telegrams—"GASFLAMME, LONDON."

Offices and Warehouse: 47, HOLBORN VIADUCT, LONDON, E.C.

IMPROVED

"Western" Pelouze and Audouin Tar Extractor.



MADE IN

ALL SIZES

FROM

50,000 TO 5,000,000

CUBIC FEET PER DIEM.

For Prices and Particulars, apply to the SOLE MAKERS FOR THE BRITISH ISLES:

W. C. HOLMES & CO.,

Contractors to His Majesty's Government,

TURNBRIDGE, HUDDERSFIELD.

London Office: Westminster Chambers, 11, Victoria Street, S.W.

THE PLAISSETTY MANTLE.

This Mantle maintains its full Illuminating Power during the whole of its Life; stands vibration better than any Mantle in the world; and has a normal life of at least 2000 hours. Candle power on "C" Burner, 19 candles per cubic foot.

THE PLAISSETTY MANTLE SYNDICATE, LIMITED, *Registered Offices:* 6, Old Serjeants Inn, Chancery Lane, W.C.

STOKER'S GLOVES.

GEO. BOULTON & SON, Wholesale Glove Manufacturers, **292, Goswell Rd., London, E.C.**

Late of 75, Goswell Road. Established 50 Years.

Will be pleased to send Sample Patterns and Prices to the Managers and Engineers of Gas Companies, similar to those which have been supplied by them to the South Metropolitan Gas Co., The Gaslight and Coke Co., Commercial Gas Co., and others.

ALL KINDS OF STOUT LEATHER GLOVES FOR FURNACE OR SMELTING WORKS MADE TO ORDER.

JAMES MILNE & SON, LTD.,

GAS ENGINEERS

MILTON HOUSE WORKS EDINBURGH.

LONDON. —— LEEDS. —— GLASGOW.

TELEPHONE NO.: 756 BANK, LONDON.

Contractors to H.M. Government.

COMPLETE GAS AND WATER WORKS ERECTED.

TELEGRAPHIC ADDRESSES: "ROBUSTNESS, LONDON." "WATER, GORING."

FLOOR-LINE, INCLINES. **RETORTS** GENERATIVE. REGENERATIVE.

GUARANTEED

RETORT-HOUSES. BORE-HOLES. WELLS. RESERVOIRS. EVERY REQUISITE.

Mainlaying.

GASHOLDERS & TANKS.

J. & H. ROBUS,

GAS AND WATER ENGINEERS,

LONDON & GORING.

20, BUCKLERSBURY.

MOBBERLEY & PERRY

STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c., &c.

EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

Contractors for the erection of Retort-Benches complete.

SAML. CUTLER & SONS, MILLWALL, LONDON.

GASHOLDERS OF EVERY DESCRIPTION.

CUTLER'S PATENT GUIDE FRAME FOR GASHOLDERS

Adopted for many large and important Gasholders.

CUTLER'S PATENT FREEZING PREVENTER

FOR GASHOLDER CUPS AND TANKS.

In extensive use in English, Continental, and American Works.

LARGE STEEL TANKS A SPECIALITY

Gasworks Plant of every kind.

STEEL FRAMED BUILDINGS.

RETORT-HOUSE ROOFS. BENCH IRONWORK.

CARBURETTED WATER GAS PLANT.

CUTLER'S PATENT INTERLOCKING GEARS.
CUTLER'S PATENT OIL SPRAYERS.
CUTLER'S PATENT TAR SEPARATOR.
CUTLER'S PATENT DUST INTERCEPTOR.

PATENT WATER TUBE CONDENSERS

OIL-TANKS. CHEMICAL PLANT.

Makers of all kinds of Constructional Ironwork.

NITRATE OF THORIUM, CERIUM, AND OTHER SALTS

FOR MAKERS OF

INCANDESCENT MANTLES.

All Materials guaranteed first class.

Dr. O. KNOEFLER & Co., Ploetzensee-Berlin.

Sole Agents for United Kingdom:

G. GARTZKE,

143. QUEEN VICTORIA STREET, LONDON, E.C.

HARPER & MOORES, Limited,

STOURBRIDGE.

MANUFACTURERS OF

Inclined, Horizontal, and Segmental

GAS-RETORTS,

Fire-Bricks, Fire-Clay Lumps, and Tiles

OF EVERY DESCRIPTION.

Also Manufacturers of **Cast-Iron Retorts, Iron Mouthpieces, Pipes, and all necessaries for Gas-Works requirements.**

Telegraphic Address: "MOORES, LYE." Telephone No. 23 Lye.

GIBBONS BROS., LTD.,

Tel. Address: "GIBBONS LOWER GORNAL." **DUDLEY.** Telephone No. 10A, DUDLEY EXCHANGE.

Gas Engineers, Contractors, Retort Setters.

INSTALLATIONS OF INCLINED RETORTS COMPLETE.

ELEVATORS AND CONVEYORS A SPECIALITY

Installation of 10 Settings of 8 Inclined Retorts recently erected by us.

PATENT REGENERATIVE SETTINGS

GIBBONS' & MASTERS' PATENT No. 1269, 1893.

SUITABLE FOR WORKS OF EVERY CAPACITY.

And a special Form of which is applicable to

GASEOUS FIRING WITH A MINIMUM EXCAVATION.

RETORT BENCH IRONWORK CONDENSERS,	*SCRUBBERS, PURIFIERS, VALVES, ROOFS,*	*GIRDERS AND STRUCTURAL IRONWORK.*

DESIGNS AND ESTIMATES ON APPLICATION.

CASES FOR BINDING VOLUMES OF THE "JOURNAL"

(GREEN CLOTH, GILT LETTERED)

MAY BE HAD OF THE PUBLISHER

PRICE 2s. EACH.

WILSON CARTER & PEARSON

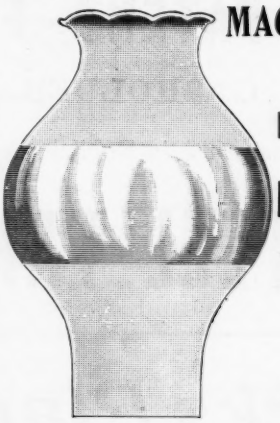
LIMITED,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station, or for Export, all kinds of Fuel for Gas and Other Purposes.

ADDRESS CHIEF OFFICES:

Temple Buildings, 50, New Street, Birmingham.



MACBETH-EVANS GLASS CO.,

PITTSBURGH, PA., U.S.A.

MAKERS OF

HIGH GRADE CHIMNEYS AND BULBS

FOR

STREET LAMPS, &c.

London Warehouse: 1 & 3, OLD SWAN LANE, E.C.

JOSEPH CLIFF & SONS

(BRANCH OF THE LEEDS FIRE-CLAY CO., LTD.),

WORTLEY, LEEDS.

Cliff's Wortley Silica Bricks.

FOR Arches and Crowns where high heats are required. They contain over 90 per cent. of Silica, and are nearly stationary under the influence of heat, swelling a little rather than contracting. They are not like a Gannister or Dinas Brick, but a Fire-Brick of a highly Silicious nature.

Cliff's Wortley Aluminous Bricks.

THESE are for Side Walls where great wear and tear takes place. Are made of a specially prepared mixture, are high in Alumina, and are what is termed a HARD FIRE BRICK.

BALTIC WHARF, WATERLOO BRIDGE, LONDON, S.E.

Liverpool: Leeds Street. Leeds: Queen Street.

Wrought-Iron

And Fittings & Accessories.

LAMBERT BROS., WALSALL,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM.

BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF WARNER'S PATENT MARKET GAS STAND-PIPE.

LONDON: LAMBETH BRASS & IRON CO., LTD., 91 & 93, SOUTHWARK ST., S.E.

BOWENS' Ltd. Successors,
"STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
ESTABLISHED 1860.

CLAYTON SON & Co LTD LEEDS
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD ALSO
THE ORIGINAL MAKERS OF
SPIRAL GUIDED GASHOLDERS
MAKERS OF ALL KINDS OF
STRUCTURAL IRON & STEEL WORK. STEEL FRAMED BUILDINGS
ROOFS RETORT FITTINGS
PURIFIERS RETORT LIDS
ANTIFREEZERS for Gasholders
STEEL TANKS
OF ALL SIZES
MAKERS OF THE LARGEST IN THE WORLD.
GASHOLDERS
OF EVERY DESCRIPTION & SIZE
HIGH CLASS BOILERS FITTED WITH DEIGHTON'S PATENT CORRUGATED FLUES.
Telegrams "GAS LEEDS." London Office 60 Queen Victoria St E.C.

MANNESMANN

LAMP POSTS
made throughout of
WELDLESS STEEL TUBING
including base, ring, and ladder rest.

Light, Strong, Unbreakable, and Cheap.

GAS, WATER, & STEAM TUBES AND FITTINGS.

WELDLESS STEEL
SPIGOT & FAUCET PIPES
for Gas and Water Mains.

Tubes can be supplied up to 10 inches diameter and in lengths up to 30 feet.

THE BRITISH MANNESMANN TUBE COMPANY, LTD.,
Landore, South Wales.
Birmingham Depôt: 110, COLMORE ROW.
London Office: 110, CANNON STREET, E.C.

ONE MOMENT PLEASE!!!

The Competitor to be feared in the future is not "Electricity" but

Cheap "Power Gas."

Now is the time to strengthen your position by supplying a good

Illuminating, Heating, and Power Gas at the Lowest Price.

For this purpose

The "Dellwik Plant" Is a Safe Investment.

SOLE MAKERS FOR THE UNITED KINGDOM,

R. & J. DEMPSTER, LTD., MANCHESTER.

R. LAIDLAW & SON, LIMITED.

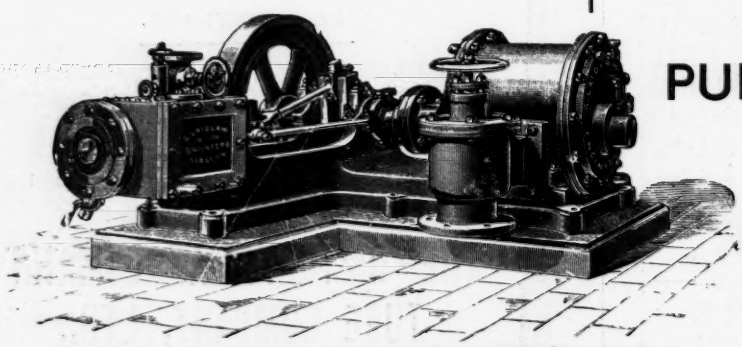
ENGINEERS & IRONFOUNDERS,

CAST-IRON PIPES

ALL SIZES.

MANUFACTURERS OF

STEAM-ENGINES,
EXHAUSTERS,
VALVES,
AND
PUMPING-ENGINES.



BEALE'S GAS EXHAUSTERS AND ENGINE COMBINED. All Sizes.

ALL KINDS OF
GAS AND WATER
APPARATUS.

ALLIANCE FOUNDRY, GLASGOW. | SIMON SQUARE WORKS, EDINBURGH. | 6, LITTLE BUSH LANE, LONDON, E.C.

CLAPHAM BROTHERS,

ESTABLISHED 1836.

LIMITED,

HAVE RECEIVED ORDERS FOR
96 Patent "ECLIPSE" Washer-Scrubbers,
To deal with **101,845,000** cub. ft. per day.

46 PATENT "ECLIPSE" WATER TUBE CONDENSERS,
Containing **454,000** feet of Pipes,
AND DURING THE LAST TWELVE MONTHS FOR
GREEN'S PURIFIERS
5136 feet of Patent **"ECLIPSE" RUBBER JOINTING,**
72 "NEW CENTURY" COVERS, COMPLETE WITH
CLAPHAM'S PATENT AUTOMATIC RAPID FASTENERS,
1852 SELF-SEALING RETORT MOUTHPIECES.
ORDERS STILL COMING.

WELLINGTON, NELSON, & MARKET STREET WORKS, KEIGHLEY.

Printed for WALTER KING by King, Sell, & Olding, Ltd.; and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Feb. 24, 1903.